LICENSE RENEWAL APPLICATION

Limerick Generating Station
Units 1 and 2

Facility Operating License Nos.
NPF-39 and NPF-85

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TABLE OF CONTENTS

SECTION 1

SECTION 2

SECTION 3

SECTION 4

<u>List of Appendices</u>

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 a renewed operating license for Limerick Generating Station, Units 1 and 2 (LGS).

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 Limerick Generating Station, Units 1 and 2, which is the subject of this application. The current Limerick Generating Station operating licenses will expire as follows:

- At midnight on October 26, 2024 for Unit 1 (Facility Operating License No. NPF-39)
- At midnight June 22, 2029 for Unit 2 (Facility Operating License No. NPF-85).

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 Generation Company, LLC, is organized under the laws of the State of Delaware. 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 Ventures Company, LLC (Exelon Ventures) is a wholly owned subsidiary of Exelon Corporation. The directors and principal officers of Exelon Generation Company, LLC, Exelon Ventures, and Exelon Corporation are U.S. citizens. Neither Exelon Generation Company, LLC, nor its parent, Exelon Ventures, are 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 Directors and Officers (Exelon Generation Company, LLC)		
Name	**Title**	**Address**
John W. Rowe	Chairman	10 S. Dearborn Street Chicago, IL 60680
Christopher M. Crane	President	4300 Winfield Road Warrenville, IL 60555
Charles G. Pardee	Chief Operating Officer	4300 Winfield Road Warrenville, IL 60555
Matthew F. Hilzinger	Chief Financial Officer	10 S. Dearborn Street Chicago, IL 60680
Kenneth W. Cornew	President , Exelon Power Team	300 Exelon Way Kennett Square, PA 19348
Sunil Garg	President, Exelon Power	300 Exelon Way Kennett Square, PA 19348
Michael J. Pacilio	President and Chief Nuclear Officer, Exelon Nuclear	4300 Winfield Road Warrenville, IL 60555
Susan R. Landahl	Chief Operating Officer, Exelon Nuclear	4300 Winfield Road Warrenville, IL 60555
Joseph P. Grimes	Senior Vice President, Mid-Atlantic Operations	200 Exelon Way Kennett Square, PA 19348
William Maguire	Site Vice President, Limerick Generating Station	LGS, 3146 Sanatoga Rd, Pottstown, PA 19464
Michael P. Gallagher	Vice President, License Renewal Projects	200 Exelon Way Kennett Square, PA 19348

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 Limerick Generating Station, Units 1 and 2, for a period of 20 years beyond the expiration of the current licenses. LGS Unit 1 license (NPF-39) expires at midnight on October 26, 2024. LGS Unit 2 license (NPF 85) expires at midnight on June 22, 2029.

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 become involved in these 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 Limerick Generating 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 Limerick Generating Station, Units 1 and 2 that are considered appropriate to give reasonable notice of the application are as follows:

Norristown Times-Herald
410 Markley Street
PO Box 409
Norristown, PA 19401

Pottstown Mercury
24 North Hanover Street
Pottstown, PA 19464

Reading Eagle
345 Penn Street
Reading, PA 19603

The Philadelphia Inquirer
P.O. Box 8263.
Philadelphia, PA 19101

1.1.10 CONFORMING CHANGES TO STANDARD INDEMNITY AGREEMENT

10 CFR 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 (B-101) for LGS 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 number, SNM -1926. 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 Limerick Generating Station 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

Eugene M. Kelly
License Renewal Senior Project Manager
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 a renewed license for Limerick Generating 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 finding required by 10 CFR 54.29.

1.4 DESCRIPTION OF THE PLANT

The Limerick Generating Station is a dual unit facility that is located on the east bank of the Schuylkill River in Limerick Township of Montgomery County, Pennsylvania, approximately 4 river miles downriver from Pottstown, 35 river miles upriver from Philadelphia, and 49 river miles above the confluence of the Schuylkill with the Delaware River.

The nuclear reactor system for each LGS unit includes a single-cycle, forced circulation, General Electric boiling-water reactor (GE BWR Type 4), housed within a GE Mark II (wet) containment. Each LGS unit reactor was originally licensed to a core thermal power of 3293 MWt although the design was evaluated to 3458MWt (Rerate Power). LGS received a license amendment for a 5 percent increase in rated power to 3458 MWt for Unit 2 on February 16, 1995 and for Unit 1 on January 24, 1996. On April 8, 2011, LGS was approved for a 1.65 percent Measurement Uncertainty Recapture (MUR) power uprate for both units. When fully implemented the licensed power level will be 3515 MWt for each unit with a projected corresponding annual average net electrical generation output per unit of 1,170 megawatts electrical (MWe).

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 aging management programs 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 components or component groups and structures 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.

Selected structural and electrical component groups, such as component supports and electrical cables, were evaluated as commodities. Under the commodity approach, selected structural and electrical component groups 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 are 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 systems, auxiliary systems, and steam and power conversions systems. 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 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 that 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.

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.

The first and third sections of Appendix B 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 based upon the results of an evaluation against 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.

The second section of Appendix B addresses each of the ten program elements for programs that are credited for managing aging that are not evaluated in NUREG-1801.

Appendix C – Commodity Groups (Optional)

Appendix C is not used.

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 – Limerick Generating 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 Limerick Generating 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
AS	Auxiliary Steam System
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
CRL	Component Record List
CUF	Cumulative Usage Factor
CUF_{en}	Environmentally Adjusted Cumulative Usage Factor
DBA	Design basis accident
DBD	Design baseline document
DBE	Design basis event
DC	Direct Current
DO	Dissolved Oxygen
DOR	Division of Operating Reactors
DOT	Department of Transportation
EAF	Environmentally-Assisted Fatigue
ECCS	Emergency Core Cooling System
ECT	Eddy Current Testing
EDG	Emergency Diesel Generator

Acronym	Meaning
EFPY	Effective full-power years
EPRI	Electric Power Research Institute
EPA	Environmental Protection Agency
EPU	Extended Power Uprate
EQ	Environmental Qualification
ESF	Engineered Safety Features
F (ºF)	Degrees Fahrenheit
FAC	Flow-accelerated corrosion
F_{en}	Environmentally Assisted Fatigue Correction Factor
FPER	Fire Protection Evaluation Report
FSAR	Final Safety Analysis Report
FSSD	Fire safe shutdown
GALL	Generic Aging Lessons Learned Report NUREG 1801
GL	Generic Letter
GSI	Generic Safety Issue
HELB	High energy line break
HEPA	High efficiency particulate air
HPCI	High Pressure Coolant Injection
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
LGS	Limerick Generating Station, Units 1 and 2.
LLRT	Local leak rate test
LOCA	Loss-of-coolant accident

Acronym	Meaning
LRA	License renewal application
LTOP	Low Temperature Overpressure Protection
MCC	Motor control center
MEAP	Material/Environment/Aging Effect/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 or Non-Destructive Testing
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

Acronym	Meaning
RW	Radwaste Systems
SBO	Station Blackout
SCC	Stress corrosion cracking
SSC	Systems Structures and Components
SR	Safety-Related
SRV	Safety relief valve
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”, Rev 1.

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

1.7.5 NUREG-1801, “Generic Aging Lessons Learned (GALL) Report,” United States Nuclear Regulatory Commission, Rev 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, Appendix B, Supplemental Fire Protection Review Criteria for License Renewal, Revision 5, March 2007

1.7.14 NUREG-0933, A Prioritization of Generic Safety Issues, U.S. Nuclear Regulatory Commission, Supplement 33, August 2010.

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 Aging Effects for Structures and Structural Components (Structural Tools), EPRI Report, Revision 1, August 2003.

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 LGS 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 in 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 in 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 LGS 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, Rev. 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 structures and components subject to aging management review in the following LRA sections:

- Section 2.3 for mechanical systems
- Section 2.4 for structures
- 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 LGS. Subsequent sections provide details of how the process was implemented.

The methodology began with scoping. The initial step in the scoping process was to define the entire plant in terms of systems and structures. 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 they perform or support a safety-related intended function, perform functions that demonstrate compliance with the requirement of one of the five license renewal regulated events, provide structural support for safety-related SSCs, or have the potential for spatial interactions with safety-related SSCs. For the systems and structures determined to be in scope, the intended functions that are the bases for including them in scope were also identified.

If any portion of a system or structure met the scoping criteria of 10 CFR 54.4, the system or structure was included in the scope of license renewal. Mechanical systems and structures were then further evaluated, to determine those mechanical and structural components that perform or support the identified intended functions. The in scope boundaries of mechanical systems and structures were developed and are described in Sections 2.3 and 2.4. These boundaries are also depicted on the license renewal Boundary Drawings. The in scope portions of the mechanical systems and structures are highlighted in color. In scope structures and mechanical components are shown in green, except nonsafety-related mechanical components that are in scope to preclude physical or spatial interaction, or provide structural support to safety-related SSCs, which are shown in red. Additional details on scoping evaluations and boundary drawing development are provided in Section 2.1.5.

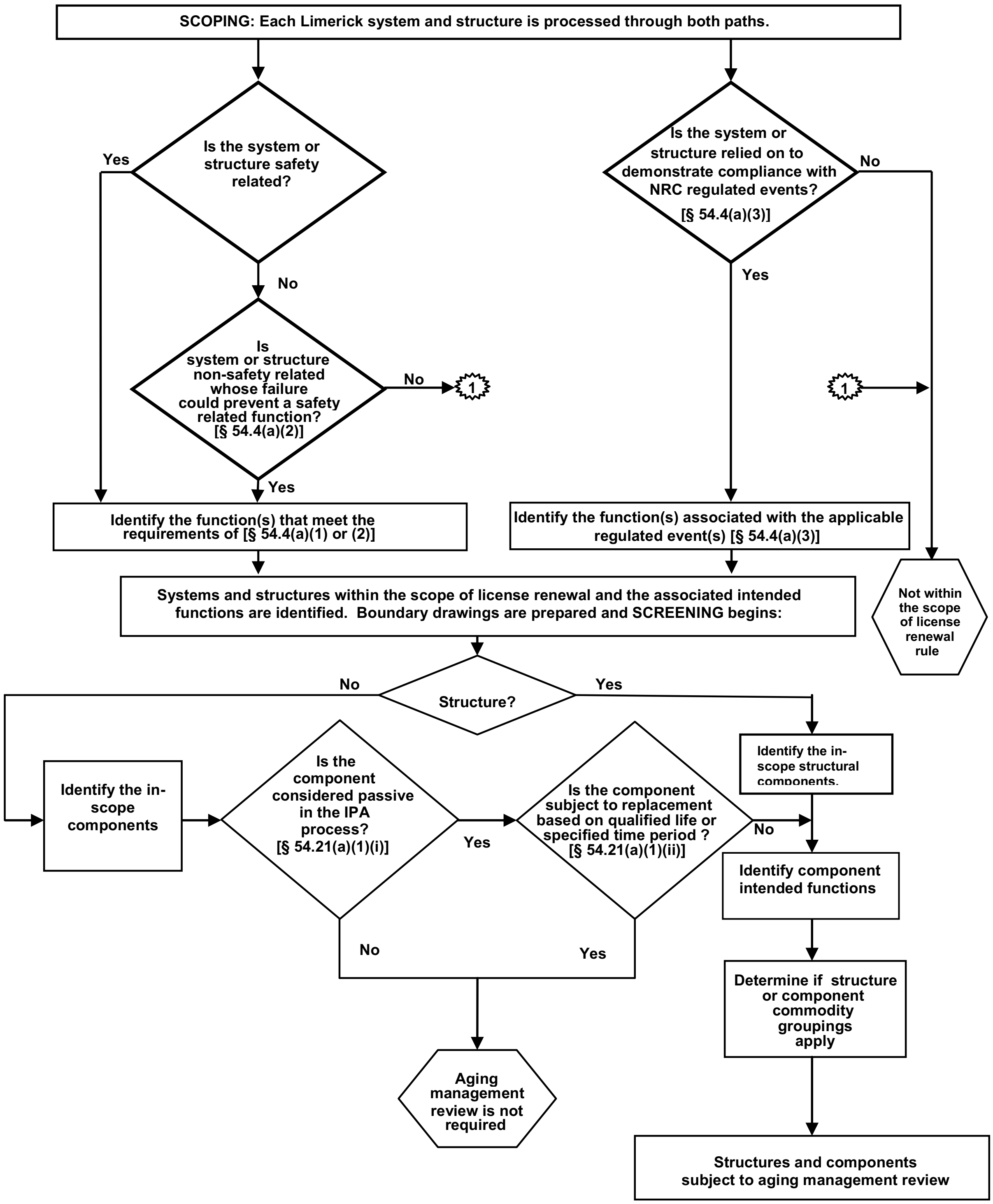
Electrical and Instrumentation and Control (I&C) systems were scoped like mechanical systems and structures per the scoping criteria in 10 CFR 54.4(a)(1), (a)(2), and (a)(3). Electrical and I&C components within the in scope electrical and I&C systems were included in the scope of license renewal. Likewise, electrical and I&C components within in scope mechanical systems were included in 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 evaluated the in scope structures and components to identify the long-lived, passive structures and components subject to an aging management review, along with the structure and component passive intended functions. Additional details on the screening process are provided in Section 2.1.6.

Selected components, such as component supports and passive electrical components were more effectively 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. Structural commodity groups are identified in Table 2.2-1. The 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
Limerick Scoping and Screening Flowchart



2.1.2 INFORMATION SOURCES USED FOR SCOPING AND SCREENING

A number of different current license basis (CLB) and design basis information sources were utilized in the scoping and screening process. The CLB for LGS is consistent with the definition provided in 10 CFR 54.3. The significant source documentation is discussed below. These source documents are available in hard copy or electronic format.

2.1.2.1 Updated Final Safety Analysis Report

The LGS Updated Final Safety Analysis Report (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 LGS 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 Evaluation Report

The Fire Protection Evaluation Report (FPER) 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 LGS is identified in the Component Record List (CRL). The CRL EQ data field is a mandatory and design quality 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 LGS systems and structures. The Maintenance Rule Database provided an additional source of information to identify system and structure functions.

2.1.2.5 Design Baseline Documents

System Design Baseline Documents (DBD) are available for selected LGS systems. Design Baseline Documents provide detailed descriptions of the associated system design basis, including system functions and design requirements. The system DBD was reviewed, when available, during the system scoping review.

Topical Design Baseline Documents are available for topical subjects such as Fire Safe Shutdown, Station Blackout, Electrical Equipment Environmental Qualification Program, Internal Hazards, External Hazards, and Design Basis Accidents, Transients, and Events. These topical DBD's were used in the development of the technical basis documents described in Section 2.1.3.

2.1.2.6 Controlled Plant Component Database

LGS maintains a controlled plant component database that contains component level design and maintenance information. The plant component database is called the Component Record List (CRL). The CRL lists plant components at the level of detail for which discrete maintenance or modification activities typically are performed. At LGS the CRL provides a listing of plant components and their quality classifications. Component type and unique component identification numbers identify each component in the database.

2.1.2.7 Other CLB References

NRC Safety Evaluation Reports include NRC staff review of LGS 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 drawings provide system, structure and component configuration details for LGS. These drawings were used in conjunction with the plant component database records to support scoping and screening evaluations.

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 LGS 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 LGS systems and structures, 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 CRL database, the systems list was evaluated against the UFSAR, the LGS Maintenance Rule Systems List, the systems lists contained in various plant administrative procedures, and various other plant CLB documents. The structures list was evaluated against the UFSAR, the LGS Maintenance Rule Structural Monitoring Program, Site Plan drawings, and various 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 LGS license renewal systems and structures is based on the LGS UFSAR and the guidance of NUREG-1801 “Generic Aging Lessons Learned (GALL) Report,” Rev. 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 in the scope of license renewal in accordance with 10 CFR 54.4(a)(1) scoping criterion. LGS plant components that have been classified as safety-related are identified as “Q-Listed” in the controlled quality classification data field in the CRL. LGS UFSAR and procedures were reviewed against the license renewal “Safety-Related” scoping criterion in 10 CFR 54.4(a)(1), to confirm that LGS 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 LGS. These systems and structures are included in the scope of license renewal under the 10 CFR 54.4(a)(1) scoping criterion.

The LGS UFSAR definition of safety-related (Q-Listed) is as follows:

Safety-related structures, components, and systems are those necessary to ensure:

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

Design Basis Events

The License Renewal Rule 10 CFR 54.4(a)(1) specifically refers to design basis events as defined in 10 CFR 50.49(b)(1), while the LGS definition of Q-Listed is applied to accidents in general terms. For LGS 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, anticipated operational occurrences, and natural phenomena as described in the current licensing basis are considered when scoping for license renewal. Safety-related systems and structures required to support 10 CFR 54.4(a)(1) functions are included in the scope of license renewal under 10 CFR 54.4(a)(1). Nonsafety-related systems and structures required to support 10 CFR 54.4(a)(1) functions are included in the scope of license renewal under 10 CFR 54.4(a)(2).

Exposure Limits

The license renewal rule refers to 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 LGS 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 four Design Basis Accidents that result in offsite exposures. These four accidents are the Loss of Coolant Accident, Main Steam Line Break, Fuel Handling Accident, and Control Rod Drop Accident. The dose consequences for these accidents result in doses that are within the guidelines of 10 CFR 50.67. Although only the four major accidents have been evaluated using the AST methodology, the AST analytical methods described in Regulatory Guide 1.183 and dose limits defined in 10 CFR 50.67 comprise the design basis for LGS for all design basis accidents.

When supplemented with the broad review of CLB design basis events, the LGS quality classification procedure 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 in the scope of license renewal. This is consistent with NUREG-1800 Section 2.1.3.1.1.

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 under 10 CFR 54.4(a)(1), were included in 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 support a safety-related 10 CFR 54.4(a)(1) function.

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

3. Nonsafety-related systems not directly connected to safety-related SSCs but 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 LGS approach to scoping of nonsafety-related systems with a potential for physical or spatial interaction with safety-related SSCs. LGS chose to implement the preventive option as described in NEI 95-10. 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. See Section 2.1.5.2 for additional discussion of the application of this scoping criterion.

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 LGS boiling water reactor design. These basis documents are summarized below:

Fire Protection

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

The scope of systems and structures required for the fire protection program to comply with the requirements of 10CFR50.48 includes:

- Systems and structures required to demonstrate post-fire safe shutdown capabilities
- Systems and structures required for fire detection and suppression
- Systems and structures required to meet commitments made to Branch Technical Position (BTP) CMEB 9.5-1.

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 LGS 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 in the scope of license renewal under the 10 CFR 54.4(a)(3) scoping criteria.

The fire detection and suppression systems at LGS 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 that are not included in the scope of license renewal are identified during system scoping. 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 in the scope of license renewal.

The LGS Environmental Qualification (EQ) program includes safety-related electrical equipment, nonsafety-related electrical equipment whose failure under postulated environmental conditions could prevent satisfactory accomplishment of safety functions of the safety-related equipment, and 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 in the scope of license renewal.

The environmental qualification basis document summarizes the results of a review of LGS 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 in the scope of license renewal under the 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 in 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 shutdown the reactor.

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 technical basis document summarizes the results of a review of the LGS current licensing basis with respect to ATWS. LGS has a Redundant Reactivity Control System (RRCS) that is designed to mitigate the potential consequences of an ATWS event. The system consists of remote control panels, their associated ATWS detection and actuation logic and the necessary interface logic to the Reactor Recirculation System, the Feedwater Control System (FCS), the Reactor Water Cleanup (RWCU) System, the Standby Liquid Control (SLC) System (for automatic initiation), and the Alternate Rod Insertion (ARI) components of the Control Rod Drive (CRD) System required to perform specific functions in response to an ATWS event.

The ATWS technical 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 in the scope of license renewal under the 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 in 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.

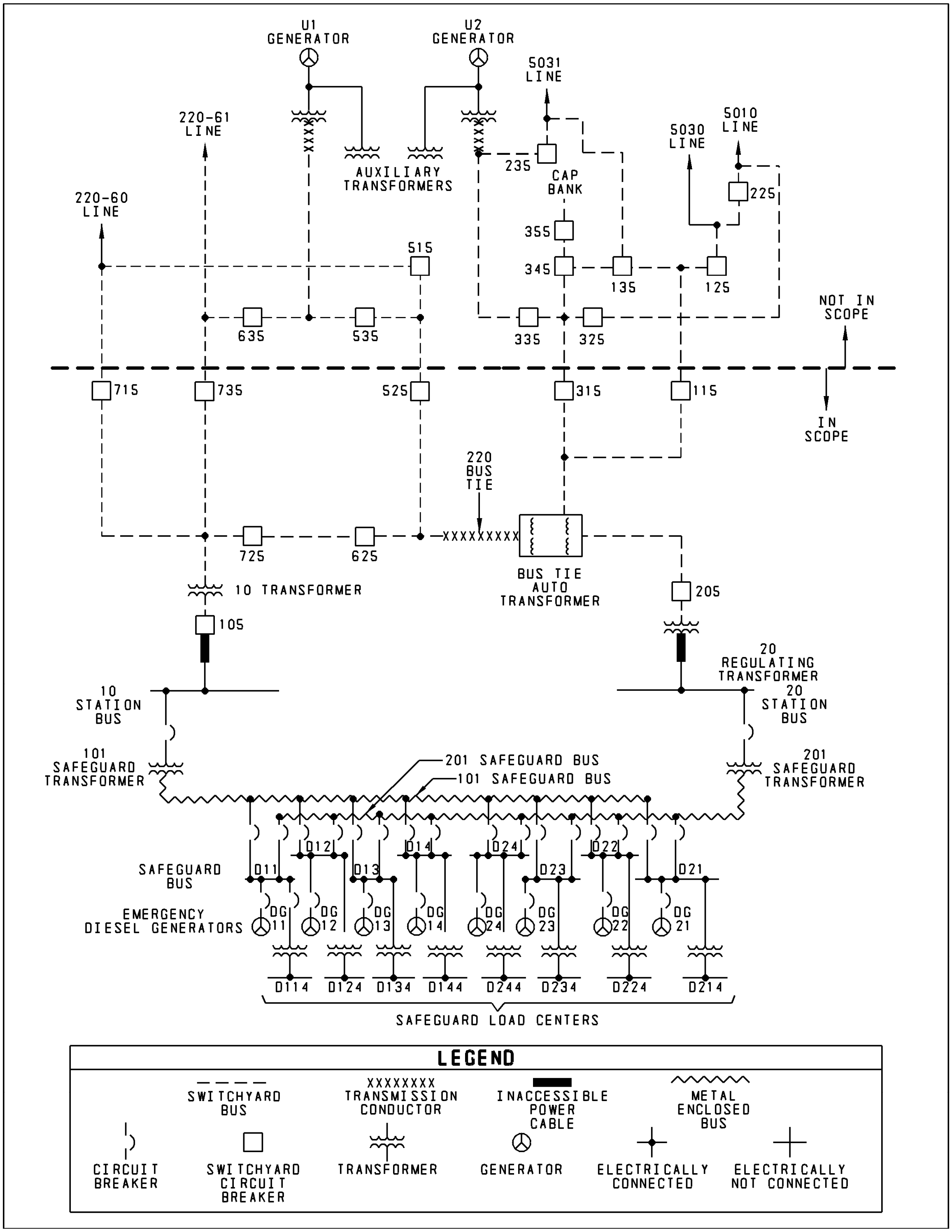
LGS satisfies the requirement of 10 CFR 50.63 as a 4-hour coping duration plant. At LGS, SBO is supported by the use of the diesel generators on the non-blacked out unit as an alternate AC (AAC) power source. The AAC power source is required to be available within one hour. LGS capabilities, commitments and analyses that demonstrate compliance with 10 CFR 50.63 are documented in UFSAR Section 15 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 LGS scoping methodology. In accordance with the NUREG-1800 requirements, the SSCs required to recover from the SBO event are included in 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 LGS, this includes the portion of the plant electrical system used to connect the in scope AC distribution system equipment to offsite power and by definition recover from an SBO event. For LGS, the boundary between the electrical transmission network and the plant electrical distribution system and equipment has been defined at the circuit breakers between the switchyard bus and the offsite transmission lines. These connections are at the 115 and 315 500 kV circuit breakers and the 525, 715, and 735 220 kV circuit breakers. These circuit breakers are the isolation devices between the plant electrical distribution system and the offsite electrical transmission network and are in scope. Included in the scope of license renewal on the plant side of this boundary are: switchyard bus and connections, transmission conductors and connectors, high voltage insulators, substation structures and supports, inaccessible power cables, metal enclosed bus, insulation material for electrical cables and connections, and cable connections (metallic parts). See Figure 2.1-2.

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

Figure 2.1-2
LGS Offsite Power for SBO



2.1.4 INTERIM STAFF GUIDANCE DISCUSSION

The NRC has encouraged applicants for license renewal to address proposed Interim Staff Guidance (ISG) issues in license renewal applications. The following is the complete list of ISG issues that have not been incorporated in current license renewal guidance documents as of December 2010.

LR-ISG-2006-03	Staff Guidance for Preparing Severe Accident Mitigation Alternatives Analyses
LR-ISG-2007-01	License Renewal Interim Staff Guidance Process, Revision 1

The following sections provide a summary discussion of each of the ISG issues:

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

The NRC staff has issued final guidance for this issue. NRC has explained that Severe Accident Mitigation Alternatives (SAMAs) for LGS do not need to be analyzed at the license renewal stage because NRC previously completed such a site-specific analysis in a supplement to the Final Environmental Impact Statement Related to the Operation of LGS Units 1 and 2. The regulatory text codified in 10 CFR 51.53(c)(3)(ii)(L) also supports this conclusion. Accordingly, no analysis of SAMAs for LGS is provided in the License Renewal Environmental Report.

2.1.4.2 License Renewal Interim Staff Guidance Process, Revision 1 (LR-ISG-2007-01)

LR-ISG-2007-01 describes a process developed by the NRC Staff to capture and communicate interim guidance for new insights, lessons learned, and emergent issues associated with license renewal activities. LR-ISG-2007-1 does not apply to the actions of applicants in preparing individual license renewal applications.

2.1.5 SCOPING PROCEDURE

The scoping process is the systematic process used to identify the LGS 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 Table 2.2-1.

The LGS 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
- Electrical Components
- Structures and Component Supports

Each LGS 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) – The five 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 LGS, the safety-related plant components are identified in the CRL database. The safety-related classifications in the LGS CRL database were established using a controlled procedure, with classification criteria consistent with the above 10 CFR 54.4(a)(1) criteria. The classification criteria 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, 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 criteria of 10 CFR 54.4(a)(1) and have been included within the scope of license renewal. Safety-related components in the CRL database were also reviewed and the system or structure associated with the safety-related component was included in scope under 10 CFR 54.4(a)(1) criterion. The review also confirmed that all plant conditions, including conditions of normal operation, abnormal operational transients, design basis accidents, internal and external events, and natural phenomena for which the plant must be designed, 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
- Directly connected to and provide structural support for safety-related SSCs
- Not directly connected but with the potential for spatial interactions with safety-related SSCs
- Mitigative plant design features used to exclude SSCs from the scope of license renewal

Each of these four 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 in scope under this review, 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 LGS 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. LGS classifies systems that are required to perform or support a safety-related function as safety-related, with the following exceptions:

- The nonsafety-related Plant Drainage System is credited to mitigate the consequences of HELB/MELB events by providing flow paths for steam and water for pressurization and flooding considerations.
- The nonsafety-related Plant Drainage System is credited to mitigate the consequences of the probable maximum precipitation in safety-related valve pits.
- The nonsafety-related Plant Drainage System is credited as a secondary containment boundary.
- The nonsafety-related Condenser and Air Removal System is credited to terminate releases from the Mechanical Vacuum Pump upon detection of high main steam line radioactivity.
- The nonsafety-related Condenser and Air Removal System, Main Steam System, and Main Turbine System are credited for post accident containment holdup and plateout of MSIV bypass leakage.
- Nonsafety-related portions of the Cranes and Hoists system provide a safe means for handling safety-related and nonsafety-related components and loads above or near safety-related components.
- Nonsafety-related portions of the Fuel Handling and Storage system provide a safe means for handling safety-related components and loads above or near safety-related components.
- The nonsafety-related Reactor Manual Control System ensures adherence to established limits for Rod Withdrawal Error and Control Rod-Drop Accident.
- The nonsafety-related toxic gas analyzers in the Control Enclosure Ventilation System support Control Room Habitability by monitoring for toxic gas contamination in the outside air intake.
- The nonsafety-related Admin Building Shop and Warehouse, Auxiliary Boiler and Lube Oil Storage Enclosure, and Turbine Enclosure are non-Category I

structures adjacent to seismic Category I structures. These structures were analytically evaluated to ensure that they will not collapse on or otherwise impair the integrity of the adjacent seismic Category I structures.

- The nonsafety-related Radwaste Enclosure is designed in accordance with seismic Category I criteria and has been classified as seismic Category IIA. The Radwaste Enclosure is immediately adjacent to the seismic Category I Reactor Enclosure.
- The nonsafety-related Piping and Component Insulation Commodity Group resists nonsafety-related SSC failure that could prevent satisfactory accomplishment of functions identified for 10 CFR 54.4(a)(1).

These nonsafety-related systems and structures were included in the scope of license renewal under 10 CFR 54.4(a)(2).

As an additional confirmation of scoping under this 10 CFR 54.4(a)(2) category, a supporting system review was completed as part of the scoping process. The scoping process was performed on a system and structure basis. When a system was included in scope under 10 CFR 54.4(a)(1), the scoping evaluation included the identification of any additional systems 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 LGS systems required to support 10 CFR 54.4(a)(1) functions are classified safety-related at LGS, and as such included in the scope of license renewal under 10 CFR 54.4(a)(1). The identification of supporting systems was not required for structures, as 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 connected and provides structural support to a safety-related piping system, the nonsafety-related piping and supports should be included within the scope of license renewal up to and including the first seismic anchor point past the safety/nonsafety interface.

For nonsafety-related systems which are not connected to safety-related piping or components, or are beyond the first seismic anchor past the safety/nonsafety interface, but have a spatial relationship such that their failure could adversely impact on 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) 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 LGS 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 preventive option is 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 piping directly connected to safety-related piping, the nonsafety-related piping was assumed to provide structural support to the safety-related piping, unless otherwise confirmed by a review of the installation details.

The nonsafety-related piping was included in scope for 10 CFR 54.4(a)(2), up to one of the following:

1. The first seismic anchor. A seismic anchor is defined as a device or structure that ensures that forces and moments are restrained in three (3) orthogonal directions.
2. 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.
3. A combination of restraints or supports that encompasses at least two (2) supports in each of three (3) orthogonal directions.
4. A base-mounted component (pump, heat exchanger, tank, etc.) that is a rugged component and is designed not to impose loads on connecting piping. The base-mounted component is included in the scope of license renewal as it has a structural support function for the safety-related piping.
5. 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).
6. A free end of nonsafety-related piping, such as a drain pipe that ends at an open floor drain.
7. 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.

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 in the scope of license renewal are identified on the license renewal boundary drawings in red. 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 spatial interaction.

Potential for Spatial Interactions with Safety-Related SSCs

Nonsafety-related systems that are not connected to safety-related piping or components, or are beyond the first seismic anchor past the safety/nonsafety interface, 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 (e.g., pipe whip restraints, jet impingement shields, spray and drip shields, seismic supports, flood barriers) to protect safety-related SSCs from failures of nonsafety-related SSCs. 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.

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 in the scope of license renewal without consideration of plant mitigative features.

LGS 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 are identified. It is assumed that nonsafety-related SSCs within these structures may be located in proximity to safety-related SSCs.

For structures that contain safety-related SSCs, there may be selected rooms within the structure that do not contain any safety-related components within the room. In a few of these cases, spatial interaction was addressed by confirming that no safety-related components are located within the room, thereby eliminating spatial interaction concerns within these rooms. CLB document reviews and plant walkdowns were utilized as appropriate to confirm that these rooms did not contain safety-related SSCs. This methodology was applied in the Turbine Enclosure to address spatial interaction between nonsafety-related SSC's and the safety-related SSC's performing the 10 CFR 54.4(a)(1) function of post accident containment holdup and plateout of MSIV bypass leakage. Turbine Enclosure rooms containing safety-related SSC's were identified and nonsafety-related fluid filled SSC's within those rooms were put in scope for potential spatial interaction. 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 excluded room. High-energy lines located within structures that contain safety-related equipment 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. Supports for all nonsafety-related SSCs within these structures are included in scope.

Nonsafety-related piping and components that contain water, oil, or steam are not excluded from scope unless it can be demonstrated that they are not in proximity to safety-related SSCs. This is demonstrated by confirming that there are no safety-related SSCs located within the same space (structure, room or enclosure) as the nonsafety-related piping or component containing water, oil, or steam. This demonstration is based on confirming that there are physical barriers (floors, walls) completely separating the nonsafety-related piping or component from safety-related SSCs, thereby preventing the potential spatial interaction. The structural barrier components are included in scope. No credit is taken for separation by distance alone without a physical barrier capable of preventing the spatial interaction.

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. LGS 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 at LGS 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.

Mitigative Plant Design Features Used to Exclude SSCs from the Scope of License Renewal

None.

2.1.5.3 <u>Regulated Events – 10 CFR 54.4(a)(3)</u>

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 50.62), 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 is therefore not applicable to LGS which is a boiling water reactor. For each of the other four applicable regulations, a technical basis document was prepared to provide input into the scoping process. Each of the regulated event technical 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 technical 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 <u>System and Structure Intended Functions</u>

For the systems and structures in 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. This provided for consistent function application and appropriate level of detail for system level function descriptions. The component level passive intended functions are those structure and component passive functions that are necessary to support the system and structure intended functions. The structure and component intended functions are further described in Section 2.1.6.2, below.

2.1.5.5 <u>Scoping Boundary Determination</u>

Systems and structures that are included in 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, electrical systems and structures are therefore described separately.

Mechanical Systems

For mechanical systems, the mechanical components that support the system intended functions are included in 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 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 CRL 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. Plant walkdowns were performed when required for additional confirmation. A single site plan layout drawing is marked up to create a license renewal boundary drawing showing the in scope structures.

Electrical and I&C 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 in 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 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 in the scope of license renewal and 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 LGS 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 systems and components 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 boundary drawings for license renewal. 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 CRL 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. Finally, the identified list of passive, long-lived system components was benchmarked against previous license renewal applications containing a similar system.

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/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 screened with the process side system. Likewise, the cooling water side of the heat exchanger is screened with the cooling water side system.

Containments, Structures, and Component Supports

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. Component listings from the CRL database were also reviewed to confirm that all structural components were considered. Plant walkdowns were performed when required for confirmation. Finally, the identified list of passive, long-lived structures and components was benchmarked against previous license renewal applications.

Electrical and I&C Commodities

Screening of electrical and I&C commodities 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.

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 license renewal in scope systems at LGS 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 and I&C commodities were identified from a review of plant documents, controlled drawings, the plant equipment database (CRL), 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 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 does not require 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”

criteria of 10 CFR 54.21(a)(1)(ii) and are “short-lived” per the regulatory definition and are therefore not subject to an aging management review.

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

The electrical commodities that require an aging management review are the separate electrical commodities that are not a 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 LGS, the electrical commodities that require an AMR are identified in Section 2.5.

2.1.6.2 Passive 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 function is an intended function if it must perform that function for the system to be able to perform the system 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. LGS 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

Passive 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.
Expansion/Separation	Provide for thermal expansion and/or seismic separation.
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).
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.
Insulation Jacket Integrity	Prevent moisture absorption and provide physical support of thermal insulation.
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 support 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).

Table 2.1-1 Passive Structure and Component Intended Function Definitions

Passive Intended Function	Definition
Pipe Whip Restraint	Provide pipe whip restraint.
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 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, 10 CFR 54.4 (a)(2).
Throttle	Provide flow restriction.
Vibration Isolation	Provide flexible support for vibrating equipment.
Water retaining boundary	Provide an essentially water leak-tight boundary.

2.1.6.3 Stored Equipment

Equipment that is stored on site for installation in response to a design basis event is considered to be within the scope of license renewal. At LGS, certain fire scenarios utilize stored equipment to mitigate the consequences of a fire. This equipment is confirmed available and in good operating condition by periodic surveillance and inspection. Tools and supplies used to place the stored equipment in service are not in 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 categories for the purpose of license renewal: (a) packing, gaskets, component seals, and O-rings; (b) structural sealants; (c) oil, grease, and component filters; and (d) system filters, fire extinguishers, fire hoses, and air packs.

- Group (a) subcomponents (packing, gaskets, seals, and O-rings): Based on ANSI B31.1 and the ASME B&PV Code Section III, the subcomponents of pressure retaining components as shown above are not pressure-retaining parts. Therefore, these subcomponents are not relied on to form a pressure-retaining function and are not subject to an AMR.
- Group (b) structural sealants: AMRs were required for structural sealants in in-scope structures. 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 either by a program for periodic replacement or by a monitoring program, based on established performance criteria, when their condition begins to degrade but before there is a loss of intended function. 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 Branch Technical Position CMEB 9.5-1 for fire brigade lockers, NFPA 10 for portable fire extinguishers, 29 CFR 1910.134 for self-contained breathing air packs, and NFPA 1962 for fire hoses. These require replacement of equipment based on their condition or performance during testing and inspection. The periodic inspections are implemented by controlled LGS 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 and previous license renewal applicants, the following GSIs are addressed for LGS license renewal:

- 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.

NUREG-0933 (Reference 1.7.14) 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 LGS IPA to identify the systems, structures, and components that are within the scope of license renewal and require an aging management review. The methodology is consistent with and satisfies the requirements of 10 CFR 54.4 and 10 CFR 54.21(a)(1).

2.2 PLANT LEVEL SCOPING RESULTS

Table 2.2-1 lists the Limerick Generating 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?	Scoping and Screening Results Section
Reactor Vessel, Internals, and Reactor Coolant System		
Reactor Coolant Pressure Boundary	Yes	2.3.1.1
Reactor Pressure Vessel	Yes	2.3.1.2
Reactor Vessel Internals	Yes	2.3.1.3
Engineered Safety Features		
Containment Atmosphere Control System	Yes	2.3.2.1
Core Spray System	Yes	2.3.2.2
High Pressure Coolant Injection System	Yes	2.3.2.3
Reactor Core Isolation Cooling System	Yes	2.3.2.4
Residual Heat Removal System	Yes	2.3.2.5
Standby Gas Treatment System	Yes	2.3.2.6
Auxiliary Systems		
Auxiliary Steam System	Yes	2.3.3.1
Closed Cooling Water System	Yes	2.3.3.2
Compressed Air System	Yes	2.3.3.3
Control Enclosure Ventilation System	Yes	2.3.3.4
Control Rod Drive System	Yes	2.3.3.5
Cranes and Hoists	Yes	2.3.3.6
Emergency Diesel Generator Enclosure Ventilation System	Yes	2.3.3.7
Emergency Diesel Generator System	Yes	2.3.3.8
Fire Protection System	Yes	2.3.3.9
Fuel Handling and Storage	Yes	2.3.3.10
Fuel Pool Cooling and Cleanup System	Yes	2.3.3.11
Miscellaneous Ventilation System	No	

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope for License Renewal?	Scoping and Screening Results Section
Nonsafety-Related Service Water System	Yes	2.3.3.12
Plant Drainage System	Yes	2.3.3.13
Primary Containment Instrument Gas System	Yes	2.3.3.14
Primary Containment Leak Testing System	Yes	2.3.3.15
Primary Containment Ventilation System	Yes	2.3.3.16
Process Radiation Monitoring System	Yes	2.3.3.17
Process and Post-Accident Sampling System	Yes	2.3.3.18
Radwaste System	Yes	2.3.3.19
Reactor Enclosure Ventilation System	Yes	2.3.3.20
Reactor Water Cleanup System	Yes	2.3.3.21
Safety Related Service Water System	Yes	2.3.3.22
Spray Pond Pump House Ventilation System	Yes	2.3.3.23
Standby Liquid Control System	Yes	2.3.3.24
Traversing Incore Probe System	Yes	2.3.3.25
Water Treatment and Distribution System	Yes	2.3.3.26
Steam and Power Conversion System		
Circulating Water System	Yes	2.3.4.1
Condensate System	Yes	2.3.4.2
Condenser and Air Removal System	Yes	2.3.4.3
Extraction Steam System	Yes	2.3.4.4
Feedwater System	Yes	2.3.4.5
Main Generator System	No	
Main Steam System	Yes	2.3.4.6
Main Turbine	Yes	2.3.4.7

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope for License Renewal?	Scoping and Screening Results Section
Structures and Component Supports		
220 and 500 kV Substations	Yes	2.4.1
Admin Building Shop and Warehouse	Yes	2.4.2
Auxiliary Boiler and Lube Oil Storage Enclosure	Yes	2.4.3
Chemistry Lab	No	Comment 1
Circulating Water Pump House	Yes	2.4.4
Component Supports Commodities Group	Yes	2.4.5
Control Enclosure	Yes	2.4.6
Cooling Towers	Yes	2.4.7
Diesel Oil Storage Tank Structures	Yes	2.4.8
Emergency Diesel Generator Enclosure	Yes	2.4.9
Independent Spent Fuel Storage Installation	No	Comment 2
Office and Administrative Facilities	No	Comment 3
Piping and Component Insulation Commodity Group	Yes	2.4.10
Primary Containment	Yes	2.4.11
Radwaste Enclosure	Yes	2.4.12
Reactor Enclosure	Yes	2.4.13
Security Structures	No	Comment 4
Service Water Pipe Tunnel	Yes	2.4.14
Spray Pond and Pump House	Yes	2.4.15
Turbine Enclosure	Yes	2.4.16
Water Intake Structures	No	Comment 5
Water Treatment Building	No	Comment 6
Yard Facilities	Yes	2.4.17

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope for License Renewal?	Scoping and Screening Results Section
Electrical Components		
120 VAC System	Yes	2.5
13 kV System	Yes	2.5
4 kV System	Yes	2.5
480 V System	Yes	2.5
Annunciator System	No	
Automatic Depressurization System	Yes	2.5
Cathodic Protection System	No	
Communications System	Yes	2.5
DC Power System	Yes	2.5
Lighting System	Yes	2.5
Miscellaneous I&C System	No	
Neutron Monitoring System	Yes	2.5
Nuclear Boiler Instrumentation System	Yes	2.5
Offsite Power System	Yes	2.5
Plant Leak Detection and Radiation Monitoring System	Yes	2.5
Primary Containment Isolation System	Yes	2.5
Reactor Manual Control System	Yes	2.5
Reactor Protection System	Yes	2.5
Redundant Reactivity Control System	Yes	2.5
Remote Shutdown System	Yes	2.5
Security System	No	

Comments:

1. The purpose of the Chemistry Lab structure is to provide support, shelter and protection for site personnel and the laboratory and office spaces in support of the

Limerick Generating Station. The Chemistry Lab is nonsafety-related and is separated from safety-related systems, structures, and components such that its failure would not impact a safety-related or intended function. Evaluation of the Chemistry Lab structure 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. This Independent Spent Fuel Storage Installation is governed by 10 CFR Part 72, and is not subject to the requirements of 10 CFR Part 54.

3. The Office and Administrative Facilities include the Heavy Hauler Transport Facility (HHTF), Site Support Building (SSB), Maintenance Muster Facility (MMF), Civil - Staff Building, Materials Management and Warehouse Building, Limerick Learning Center (LLC, formally known as Site Management Building), Simulator Building, J. S. Kemper Building (formerly known as the construction office), Technical Support Center (TSC), Personnel Processing Center (PPC), Tool Storage Building, Facilities Shop, and Rigging Storage Building. The purpose of the Office and Administrative Facilities is to provide support, shelter, and protection for plant personnel, equipment and facilities that utilize office space, conference rooms, storage space, shop areas and their supporting facilities for LGS. The Office and Administrative Facilities structures are nonsafety-related and are separated from safety-related systems, structures, and components such that their failure would not impact a safety-related or intended function. Evaluation of the Office and Administrative Facilities Enclosures determined that they do not perform an intended function delineated in 10 CFR 54.4 (a) and are not in scope for license renewal.

4. The purpose of the Security Structures is to provide support, shelter, and protection for the plant security force and equipment required to control access into the protected area as required by 10 CFR 73. Evaluation of the Security Structures and security features determined that they do not perform an intended function delineated in 10 CFR 54.4 (a) and are not in scope for license renewal.

5. The Water Intake Structures include the Schuylkill Pump Structure and the Perkiomen Pump Structure. The purpose of the Water Intake Structures is to provide structural support, shelter, and protection for the makeup water supply system and supporting system components. The makeup water supply system provides makeup water to the Cooling Towers and the Spray Pond. The Water Intake Structures are nonsafety-related and are separated from safety-related systems, structures, and components such that their failure would not impact a safety-related or intended function. Evaluation of the Water Intake Structures determined that they do not perform an intended function delineated in 10 CFR 54.4 (a) and are not in scope for license renewal.

6. The purpose of the Water Treatment Building is to provide structural support, shelter and protection for the nonsafety-related Water Treatment and Distribution System components and supporting systems. Components housed in this building include tanks, pumps, associated piping and piping components, panels and enclosures, electrical commodities and associated water treatment components that have been evaluated and determined to not be in scope for license renewal. The Water Treatment Building is nonsafety-related and is separated from safety-related systems, structures, and components such that its

failure would not impact a safety-related or intended function. Evaluation of the Water Treatment 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 (2.3.1.1)
- Reactor Pressure Vessel (2.3.1.2)
- Reactor Vessel Internals (2.3.1.3)

2.3.1.1 Reactor Coolant Pressure Boundary

Description

The Reactor Coolant Pressure Boundary is a normally operating system designed to provide forced circulation of coolant through the core to remove the heat generated by fission, to provide a path for core spray, standby liquid control, residual heat removal, and low pressure coolant injection, to remove steam from the reactor, to provide feedwater flow to the reactor, to provide pressure relief for the reactor coolant pressure boundary, and to maintain the reactor coolant pressure boundary. The Reactor Coolant Pressure Boundary contains all the pressure containing components which are part of the reactor recirculation system or connected to the reactor recirculation system, up to and including any and all of the following; the outermost containment isolation valve in system piping which penetrates primary reactor containment, the second of two valves normally closed during normal reactor operation in system piping which does not penetrate primary reactor containment, and the reactor coolant system safety and relief valves.

The Reactor Coolant Pressure Boundary includes the Reactor Recirculation loops and the Class 1 portions of various systems connected to the Reactor Pressure Vessel (RPV) and the Reactor Recirculation loops.

The Reactor Coolant Pressure Boundary consists of the Class 1 portions of the following plant systems: Core Spray, Feedwater, High Pressure Coolant Injection (HCPI), Main Steam, Nuclear Boiler, Nuclear Boiler Instrumentation, Reactor Recirculation, Reactor Core Isolation Cooling (RCIC), Reactor Water Cleanup (RWCU), Residual Heat Removal (RHR), and Standby Liquid Control (SLC).

For more detailed information see UFSAR Sections 5.1, 5.2.

Boundary

The Reactor Coolant Pressure Boundary (RCPB) license renewal scoping boundary begins at the piping attached to the RPV nozzle safe end to piping weld. This includes the piping connections to the 10 recirculation inlet nozzles, two recirculation outlet nozzles, four steam outlet nozzles, six feedwater nozzles, two core spray nozzles, four low pressure coolant injection nozzles, 10 instrumentation nozzles, two jet pump instrument nozzles, one core differential pressure nozzle, one drain nozzle, one vent nozzle, and the seal leak detection nozzle. The RCPB includes the main recirculation flowpath, which begins at the suction piping attached to the RPV nozzles, continues through the suction piping, suction valves, recirculation pump casings, discharge valves and discharge piping back to the attached piping to the RPV nozzles. Also included is the process sample line from the recirculation pump discharge header to the second normally closed isolation valve. The tube side of the recirculation pump seal cooler is included as well as the recirculation pump motor upper bearing lube oil piping connection to the high and low level switch. Also included are the recirculation pump seal purge piping and instrument lines up to and including the excess flow check valves outside of containment.

The RCPB continues at the 20-inch RHR suction off the reactor recirculation pump B suction line to the outermost containment isolation valve and includes the 12-inch RHR return from the outermost containment valve to the connection to the 28-inch A and B recirculation inlet. The

RCPB also includes the six-inch RWCU connection off the RHR piping to the outermost containment isolation valve and the two-inch reactor vessel drain from the RPV nozzle to the second normally closed isolation valve and the four-inch connection to the six-inch RWCU piping.

The RCPB includes the RHR piping that provides low pressure coolant injection from the outboard containment isolation to the RPV nozzles. Also included are the instrument lines up to and including the excess flow check valves outside of containment. The RCPB includes the feedwater piping and components from the outboard containment isolation valve, including the attached Class 1 feedwater piping, to the piping attached to the RPV nozzles. The RWCU piping return to feedwater piping is included from the second normally closed isolation valve to the connection to the feedwater piping inside containment.

The RCPB includes the core spray piping and components from the outboard containment isolation valve to the piping attached to the RPV nozzles.

The RCPB includes the SLC piping and components from the outboard containment isolation valve to the two-inch piping connection to the core spray piping inside containment.

The RCPB includes the main steam piping and components from the piping attached to the RPV nozzles 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 steam supply piping to the HPCI steam turbine and the RCIC steam turbine up to the outboard containment isolation valve are included in the RCPB. Also included are the instrument lines up to and including the excess flow check valves outside of containment.

The RCPB includes the reactor head vent piping and components from the piping attached to the RPV nozzle to the second normally closed valve, and to the two-inch connection to the C main steam line, and to the excess flow check valve outside containment. The RCPB includes the seal leak detection line from the RPV flange connection to the second normally closed valve. The core plate differential pressure sensing piping and components are included in the RCPB from the piping attached to the RPV nozzle to the excess flow check valves outside of containment. The jet pump instrument sensing lines and all RPV instrumentation lines are included in the RCPB from the piping attached to the RPV nozzles to the excess flow check valves outside of containment. Also included is the instrument tubing downstream of the excess flow check valves. The RCPB includes drywell instrumentation piping and instrument tubing. The reactor recirculation system instrumentation piping and components are included in the RCPB from the connection to the recirculation piping to the excess flow check valves.

All associated piping, components and instrumentation within the flowpaths described above are included in the system evaluation. Instrumentation downstream of the excess flow check valves is included as shown on the boundary drawings.

Included in the license renewal scoping boundary are those fluid filled portions of nonsafety-related piping and equipment located in proximity to equipment performing a safety-related function. This includes the nonsafety-related portions of the system located in the reactor enclosure 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 drawings for identification of this boundary, shown in red.

Reason for Scope Determination

The Reactor Coolant Pressure Boundary 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 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 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 forms a barrier to minimize the release of reactor coolant and radioactive material to the reactor enclosure. The Reactor Coolant Pressure Boundary, 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 containment isolation valves close automatically on isolation signals. 10 CFR 54.4(a)(1)

3. Sense process conditions and generate signals for reactor trip or engineered safety features actuations. Reactor Coolant Pressure Boundary process conditions provide input signals to the Primary Containment Isolation System. 10 CFR 54.4(a)(1)

4. Provides structural support or restraint to SSCs in scope for license renewal. The Recirculation Pump Motor Driver Mount provides structural support for Reactor Coolant Pressure Boundary piping components. 10 CFR 54.4(a)(1)

5. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The Reactor Coolant Pressure Boundary contains nonsafety-related fluid filled lines within the reactor enclosure and primary containment which have the potential for spatial interaction with safety-related SSCs. 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 Fire Protection (10 CFR 50.48). The Reactor Coolant Pressure Boundary provides the flow path and maintains the pressure boundary for reactor safe shutdown. 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 Environmental Qualification (10 CFR 50.49). The Reactor Coolant Pressure Boundary includes components that are environmentally qualified. 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 ATWS (10 CFR 50.62). Reactor Coolant Pressure Boundary components receive the recirculation pump trip signal from the Redundant Reactivity Control System (RRCS), provide the flow path and maintain the pressure boundary for Standby Liquid Control (SLC) injection, and receive the isolation signal from SLC and

RRCS to close RWCU isolation valves. 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 Reactor Coolant Pressure Boundary provides the flow path and maintains the pressure boundary for reactor safe shutdown. 10 CFR 54.4(a)(3)

UFSAR References

5.1
5.2
5.4.1

License Renewal Boundary Drawings

LR-M-41, Sheet 1
LR-M-41, Sheet 2
LR-M-41, Sheet 4
LR-M-41, Sheet 5
LR-M-42, Sheet 1
LR-M-42, Sheet 3
LR-M-42, Sheet 5
LR-M-42, Sheet 6
LR-M-43, Sheet 1
LR-M-43, Sheet 2
LR-M-43, Sheet 3
LR-M-43, Sheet 4
LR-M-44, Sheet 1
LR-M-44, Sheet 3
LR-M-48, Sheet 1
LR-M-48, Sheet 2
LR-M-49, Sheet 1
LR-M-49, Sheet 2
LR-M-51, Sheet 1
LR-M-51, Sheet 3
LR-M-51, Sheet 5
LR-M-51, Sheet 7
LR-M-52, Sheet 1
LR-M-52, Sheet 3
LR-M-55, Sheet 1
LR-M-55, Sheet 2

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

Component Type	Intended Function
Bolting	Mechanical Closure
Class 1 Piping, Fittings and Branch Connections < NPS 4"	Pressure Boundary
Flow Device (Instrumentation Flow Orifices)	Throttle
Flow Device (Main Steam Flow Elements)	Throttle
Heat Exchanger Components (Recirculation Pump Seal Cooler Tubes)	Pressure Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing (Recirculation Pump)	Pressure Boundary
RPV Flange Leak Detection Line	Pressure Boundary
Recirc Motor Driver Mount	Structural Support
Valve Body	Pressure Boundary

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

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

2.3.1.2 Reactor Pressure Vessel

Description

The Reactor Pressure Vessel (RPV) is a normally operating system designed to contain pressure and heat in the core and transfer this heat to the reactor coolant. The RPV 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 Pressure Vessel is in scope for license renewal and consists of the following plant system: Nuclear Boiler. The RPV has interfaces with several other systems and components that are not within the license renewal boundary of the RPV but are evaluated separately. These include the Control Rod Drive System, Neutron Monitoring System, Primary Containment Structure, Reactor Coolant Pressure Boundary, and Reactor Vessel Internals.

The purpose of the Reactor Pressure 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 Pressure 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 license renewal scoping boundary of the Reactor Pressure Vessel is comprised of the RPV, including nozzles and safe ends, closure studs and nuts, and the vessel support skirt. The RPV nozzles and safe ends include 10 recirculation inlet nozzles, two recirculation outlet nozzles, four steam outlet nozzles, six feedwater nozzles, two core spray nozzles, four low pressure coolant injection nozzles, 10 instrumentation nozzles, one control rod drive hydraulic system return nozzle, two jet pump instrument nozzles, one core differential pressure nozzle, one drain nozzle, 55 flux monitor penetrations, 185 control rod drive penetrations, one head spray nozzle, one spare nozzle, one vent nozzle, and the flange seal leak detection line nozzle. The piping and components that are attached to each of these nozzles is in the license renewal Reactor Coolant Pressure Boundary. The boundary between the Reactor Pressure Vessel and the Reactor Coolant Pressure Boundary is at the safe end weld to the attached piping and components in the Reactor Coolant Pressure Boundary. The boundary between the Reactor Pressure Vessel and the Control Rod Drive System is at the flange attached to the Control Rod Drive System piping. The boundary between the Reactor Pressure Vessel and the Neutron Monitoring System is at the flange connected to the Neutron Monitoring System drive units.

There are multiple attachments to the RPV 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 Pressure Vessel and the Reactor Vessel Internals is at the bracket. The bracket is included with the Reactor Pressure Vessel. Any attached components are included with the Reactor Vessel Internals.

There are also external attachments to the RPV within the scope of the Reactor Pressure Vessel. The RPV support skirt, stabilizer brackets and refueling bellows bracket are in the Reactor Pressure Vessel license renewal boundary. The refueling bellows is evaluated for license renewal within the Primary Containment Structure. The RPV top head lifting lugs do not have an intended function and are not within the scope of license renewal.

Reason for Scope Determination

The Reactor Pressure 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 Pressure 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 Pressure 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 Pressure 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 Pressure Vessel forms a barrier against the release of reactor coolant and radioactive material to the reactor enclosure. 10 CFR 54.4(a)(1)

2. Maintain reactor core assembly geometry. The Reactor Pressure Vessel provides support to the Reactor Vessel Internals. The Reactor Pressure 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 scope for license renewal. The reactor pressure vessel support skirt and stabilizer brackets provide structural support for Reactor Pressure 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 Pressure 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 ATWS (10 CFR 50.62). The Reactor Pressure Vessel provides the flow path and maintains the pressure boundary for Standby Liquid Control System 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 Pressure 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

LR-M-41, Sheet 1
LR-M-41, Sheet 2
LR-M-42, Sheet 1
LR-M-43, Sheet 1
LR-M-43, Sheet 3

Table 2.3.1-2 Reactor Pressure Vessel
Component 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
CRD Housing Penetration	Pressure Boundary
Incore Monitor Penetration	Pressure Boundary
Nozzle (N1 Recirculation Outlet)	Pressure Boundary
Nozzle (N10 Core Differential Pressure)	Pressure Boundary
Nozzle (N11 Instrumentation)	Pressure Boundary
Nozzle (N12 Instrumentation)	Pressure Boundary
Nozzle (N13 Seal Leak Detection)	Pressure Boundary
Nozzle (N15 Drain)	Pressure Boundary
Nozzle (N16 Instrumentation)	Pressure Boundary
Nozzle (N17 LPCI)	Direct Flow (Thermal Sleeve)
	Pressure Boundary
Nozzle (N2 Recirculation Inlet)	Direct Flow (Thermal Sleeve)
	Pressure Boundary
Nozzle (N3 Steam Outlet)	Pressure Boundary
Nozzle (N4 Feedwater)	Direct Flow (Thermal Sleeve)
	Pressure Boundary
Nozzle (N5 Core Spray)	Direct Flow (Thermal Sleeve)
	Pressure Boundary
Nozzle (N6, N7 Head Spray, Spare, Vent)	Pressure Boundary
Nozzle (N8 Jet Pump Instrumentation)	Pressure Boundary
Nozzle (N9 CRD Return Line - Capped)	Pressure Boundary
Nozzle Safe Ends and Welds (N1 Recirculation Outlet)	Pressure Boundary
Nozzle Safe Ends and Welds (N10 Core Differential Pressure)	Pressure Boundary
Nozzle Safe Ends and Welds (N17 LPCI)	Pressure Boundary
Nozzle Safe Ends and Welds (N2 Recirculation Inlet)	Pressure Boundary
Nozzle Safe Ends and Welds (N3 Steam Outlet)	Pressure Boundary
Nozzle Safe Ends and Welds (N4 Feedwater)	Pressure Boundary
Nozzle Safe Ends and Welds (N5 Core Spray)	Pressure Boundary
Nozzle Safe Ends and Welds (N8 Jet Pump Instrumentation)	Pressure Boundary
Nozzle Safe Ends and Welds (N9 CRD Return Line - Capped)	Pressure Boundary
Reactor Vessel (Bottom Head, Welds)	Pressure Boundary
Reactor Vessel (Shell and Welds)	Pressure Boundary

Component Type	Intended Function
Reactor Vessel (Top Head, Flanges, Welds)	Pressure Boundary
Reactor Vessel External Attachments (Stabilizer Bracket)	Structural Support
Reactor Vessel External Attachments (Support Skirt, Refueling Bellows 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 Pressure 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 Pressure Vessel that is designed to control the generation of heat in the reactor core, transfer this heat to the reactor coolant and supply dry steam to the Main Steam System. The Reactor Vessel Internals includes the fuel assemblies that generate the heat in the core and the control rod assemblies that control reactivity in the core. The Reactor Vessel Internals includes the core shroud, shroud support and access hole covers, shroud head and steam separator, core support plate and holddown bolts, top guide, control rod drive (CRD) housings, control rod guide tubes, fuel supports, core spray lines and spargers, feedwater spargers, incore instrument housings, differential pressure lines, low pressure coolant injection (LPCI) couplings, surveillance sample holders, jet pump assemblies, and the steam dryer assembly.

The purpose of the Reactor Vessel Internals is to maintain reactor core assembly geometry, achieve and maintain the reactor core subcritical for any mode of normal operation or event, control reactivity in the nuclear reactor core, and 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, maintain structural integrity, and provide a fission product barrier. The purpose of the control rod assemblies is to absorb neutrons in the reactor core to control reactivity. The core shroud, shroud support, core support plate, top guide, CRD housings, fuel supports, and control rod guide tubes provide support and orientation of the reactor core, control rod assemblies, and the incore instrumentation. The configuration of the core shroud, core plate, and jet pump assemblies maintain a floodable volume. The feedwater spargers provide cooling water that mixes with the downcomer flow from the steam separators and dryer. The core spray lines and spargers distribute coolant to the shroud during accident conditions. The LPCI couplings provide coolant inside the core shroud. The steam dryer assembly removes moisture from the wet steam leaving the steam separators. The system is required for plant start-up, normal plant operations and normal shutdown.

For more detailed information see UFSAR Sections 3.9.5 and 4.1.2.

Boundary

The Reactor Vessel Internals license renewal scoping boundary includes all components that are inside the reactor vessel. The following Reactor Vessel Internals components perform a safety-related function and therefore are within the scope of license renewal: the core shroud, shroud support and access hole covers, core spray piping and spargers, low pressure coolant injection couplings, core plate and core plate bolts, fuel supports, control rod guide tubes and housings, top guide, jet pumps, and incore instrument housings. Also within the scope of license renewal are any reactor vessel internal component modifications or repair hardware. The steam dryer is also included in the scope of license renewal. The steam dryer does not perform a safety-related function; however, it is included in the license renewal scope, because failure of the steam dryer could potentially prevent satisfactory accomplishment of the safety-related functions.

The fuel assemblies and control rod assemblies are in scope for license renewal; however they are short-lived components and are therefore not subject to aging management review. The following Reactor Vessel Internals components are not required to support intended functions and are not included within the scope of license renewal; the feedwater sparger, the shroud head and steam separator assembly including the guide rods and guide pins, core plate differential sensing lines, incore guide tube stabilizers, fuel orifices, and the surveillance sample holders. A safety assessment for these components has been documented in BWRVIP-06-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 any safety-related equipment.

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 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 Fire Protection (10 CFR 50.48) and Environmental Qualification (10 CFR 50.49).

Intended Functions

1. Provide reactor coolant pressure boundary. The control rod drive housings and incore flux monitor housings are part of the reactor coolant pressure boundary. 10 CFR 54.4(a)(1)

2. Maintain reactor core assembly geometry and a floodable volume. The reactor internal components in conjunction with the reactor vessel are designed to provide physical support for the fuel, steam dryer and other components, and 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)

3. Achieve and maintain the reactor core subcritical for any mode of normal operation or event. The Control Rod Assemblies adjust the concentration of the neutron absorber in the core. 10 CFR 54.4(a)(1)

4. Introduce emergency negative reactivity to make the reactor subcritical. When a scram signal is received, high pressure water from an accumulator for each rod forces each control rod rapidly into the core. 10 CFR 54.4(a)(1)

5. Distribute coolant during accident conditions. The core spray piping and spargers and low pressure coolant injection couplings distribute emergency core cooling flow 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. Nonsafety-related portions of the system, including the steam dryer, could interact with safety-related portions of the system. 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

(10CFR50.62). The Standby Liquid Control System injects through the core spray piping and spargers. 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 are required for safe shutdown of the reactor. 10 CFR 54.4(a)(3)

UFSAR References

3.9.5
4.2
5.1
Table 3.2-1

License Renewal Boundary Drawings

UFSAR Figure 3.9-4

Table 2.3.1-3 Reactor Vessel Internals
Component 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)	Structural Support to maintain core configuration and flow distribution
Core Shroud and Core Plate: Access hole cover (welded covers)	Structural Support to maintain core configuration and flow distribution
Core Shroud and Core Plate: Core plate, Core plate bolts (used in early BWRs)	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, Thermal sleeves	Direct Flow
Fuel Supports and Control Rod Drive Assemblies: Orificed fuel support	Structural Support to maintain core configuration and flow distribution
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	Pressure Boundary
Jet Pump Assemblies: Jet pump sensing line	Pressure Boundary
Jet Pump Assemblies: Thermal sleeve inlet header, Riser brace arm, Holddown beams, Inlet elbow, Mixing assembly, Diffuser Castings, Slip joint clamp, Wedge assemblies	Pressure Boundary
Reactor Vessel Internals Components (Control Rod Guide Tube)	Structural Support to maintain core configuration and flow distribution
Steam Dryers	Structural Support
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:

- Containment Atmosphere Control System (2.3.2.1)
- Core Spray System (2.3.2.2)
- High Pressure Coolant Injection System (2.3.2.3)
- Reactor Core Isolation Cooling System (2.3.2.4)
- Residual Heat Removal System (2.3.2.5)
- Standby Gas Treatment System (2.3.2.6)

2.3.2.1 Containment Atmosphere Control System

Description

The Containment Atmosphere Control (CAC) System consists of the following subsystems: Liquid Nitrogen Supply subsystem that is common to Unit 1 and Unit 2, Containment Inerting and Purging subsystem, Containment Vacuum Relief subsystem, Combustible Gas Analyzer subsystem, Containment Hydrogen Recombiner subsystem and instrumentation used to monitor containment temperature and pressure. The CAC System is in scope for license renewal. However, portions of the CAC System are not required to perform intended functions and are not in scope. The purpose of the CAC System includes: inerting primary containment with nitrogen, purging containment with air to permit maintenance, limiting differential pressure between the drywell and suppression chamber, monitoring of containment temperature, pressure, hydrogen and oxygen levels, and controlling combustible gas concentrations after a LOCA.

The Liquid Nitrogen Supply subsystem is a standby, manually operated system that provides a supply of gaseous nitrogen to the Containment Inerting and Purge subsystem on both units to maintain an inert atmosphere within primary containment. The Liquid Nitrogen Supply subsystem also supplies nitrogen to the Condenser and Air Removal System and gaseous Radwaste System for purging system piping, to the Control Enclosure Ventilation System to provide zero gas to the toxic chemical detection system, and to the Traversing Incore Probe (TIP) System to maintain a dry environment within components and tubing. The Liquid Nitrogen Supply subsystem includes two redundant liquid nitrogen storage tanks and pressure build coils, a water bath vaporizer heated by auxiliary steam to support high volume inerting operations, two ambient air vaporizers and a trim electric heater to support low volume makeup, and associated instrumentation, controls, valves and piping. Nitrogen flow from the water bath vaporizer or the ambient air vaporizers merge into one common header to supply nitrogen to Containment Inerting and Purge Subsystem for each unit. Nitrogen supply to the Condenser and Air Removal System, gaseous Radwaste System, Control Enclosure Ventilation System and TIP System pass through the ambient air vaporizers. The Liquid Nitrogen Supply subsystem is a nonsafety-related system and is not in scope for license renewal since it does not support any intended functions.

The Containment Inerting and Purging subsystem is a standby, manually operated system that maintains an inert atmosphere within the primary containment during plant operations to preclude energy releases from a fire or hydrogen-oxygen reaction following a postulated LOCA. The purpose of the Containment Inerting and Purging subsystem is to provide nitrogen to primary containment to maintain an inert atmosphere with low oxygen concentration that cannot support combustion. To ready the primary containment for power operation, the Containment Inerting and Purging subsystem is aligned to supply nitrogen from the Liquid Nitrogen Supply subsystem to the primary containment and vent displaced air to the Standby Gas Treatment System (SGTS) prior to discharge to the environment. During power operation, the Containment Inerting and Purging subsystem is manually operated to supply makeup nitrogen to maintain a low oxygen concentration in the primary containment. During power operation, when nitrogen makeup is not in service, the nitrogen 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 Inerting and Purging subsystem can be used to maintain low oxygen concentration by manually over-riding isolation signals and aligning the Liquid Nitrogen Supply subsystem for makeup to primary containment. The Containment Inerting and Purging subsystem is also used to vent containment by manually over-riding isolation signals and aligning the vent flow path to the SGTS prior to discharge to the environment. During outage conditions, to prepare the containment for maintenance activity, the drywell and suppression chamber air spaces are purged with air. The SGTS supplies a high volume of air to the drywell and suppression chamber and the displaced nitrogen is vented to the SGTS prior to discharge to the environment. All Containment Inerting and Purging subsystem 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 enclosure ventilation exhaust high radiation signals. These isolation signals can be overridden if needed. The portions of the Containment Inerting and Purging subsystem that maintain the primary containment boundary and provide the venting flow path to the SGTS are safety-related, designed to seismic Category 1 requirements, and are in scope for license renewal.

The Vacuum Relief Valves subsystem consists of four vacuum relief valve assemblies that are mounted on downcomers that connect the drywell and suppression chamber air space. The purpose of the Vacuum Relief Valves subsystem is to limit the amount of differential pressure across the diaphragm slab that separates the suppression chamber air space and drywell following a LOCA. Each vacuum relief valve assembly consists of two 24-inch vacuum relief valves mounted in series. The Vacuum Relief Valves subsystem is safety-related, designed to seismic Category 1 requirements and is in scope for license renewal.

The Combustible Gas Analyzer subsystem is a standby, manually operated system consisting of two manually operated analyzer packages, each including a hydrogen analyzer cell and an oxygen analyzer cell. The purpose of the Combustible Gas Analyzer subsystem is to monitor primary containment atmosphere to ensure that an inert atmosphere is maintained during normal plant operations, and oxygen and hydrogen levels do not approach flammability limits during post-accident conditions. Each analyzer package consists of a cabinet in the Reactor Enclosure Structure that houses the analyzer cells and sample pumps, and a control panel in the main control room with controls to select sample points, operate sample pumps and provide indication of oxygen and hydrogen concentrations. Piping from sample locations in the drywell, the suppression chamber and from the drywell and suppression chamber exhaust piping are routed to the analyzer cabinets. Both analyzer packages can sample either the drywell or suppression chamber. Containment gas is returned to the containment after passing through the analyzers. The sample supply and return sensing lines each have two solenoid operated valves that receive automatic isolation signals from the Primary Containment Isolation System. The isolation signals can be manually over-ridden to allow for gas analyzer operation following an accident. During normal power operation, the Combustible Gas Analyzer subsystem is maintained in standby mode unless it is being used to periodically monitor oxygen and hydrogen concentrations. During post accident conditions, the isolation signals to the sample valves can be over-ridden, sample supply and return isolation valves opened, and the analyzers operated continuously to monitor hydrogen and oxygen concentrations.

The operation of the oxygen and hydrogen analyzer cells is based on the measurement of thermal conductivity of the gas sample. The hydrogen analyzer cell uses a catalytic combustion process by removing the hydrogen from the sample through catalytic recombination with a reagent gas (oxygen). The thermal conductivity is measured prior to and after recombination, and the two values are compared and converted to a concentration value for the containment sample. The oxygen analyzer cell operates in a similar manner, except the reagent gas is hydrogen. The Combustible Gas Analyzer subsystem was installed as a safety-related system and designed to seismic Category 1 requirements. The licensing design bases requirements for the system have been modified by approved license amendments that allow the system to be downgraded to nonsafety-related and non-redundant. The Combustible Gas Analyzer subsystem is in scope for license renewal since commitments to maintain the system within emergency and operating procedures and the Maintenance Program are maintained within the licensing design bases.

The Containment Hydrogen Recombiner subsystem is a standby, manually operated system that is comprised of two redundant hydrogen recombiner packages located outside of primary containment. Each recombiner package has adequate processing capacity to control the quantity of the hydrogen and oxygen generated in the primary containment after a LOCA. The Containment Hydrogen Recombiner subsystem is a safety-related system and designed to seismic Category 1 requirements. The Containment Hydrogen Recombiner subsystem includes valves that automatically close upon receipt of signals from the Primary Containment Isolation System, and piping that is part of the primary containment boundary. During normal plant operation, the hydrogen recombiners are isolated from containment. During post-accident conditions, when hydrogen levels in containment are elevated, the isolation signals can be over-ridden and flow established from the drywell air space through the recombiner packages to the suppression chamber air space.

The CAC System boundary also includes instrumentation used to monitor primary containment temperature and pressure. The purpose of this instrumentation is to provide signals to initiate engineered safeguards systems in the event of an indicated reactor coolant leak, and to provide operators with redundant indications of primary containment conditions. The associated piping, tubing, valves and instrumentation are safety-related, designed to seismic Category 1 requirements and are in scope for license renewal. The drywell temperature elements are in scope for license renewal, however they do not have a passive intended function, are therefore considered active, and not subject to aging management review.

For more detailed information, see UFSAR Sections 6.2.5, 7.3.1.1.6 and 9.4.5.1.

Boundary

The CAC System boundary begins at the liquid nitrogen storage tanks and includes the pressure build coils, water bath vaporizer, ambient air vaporizers and associated piping instrumentation and controls. The CAC System boundary continues from the vaporizers to piping that passes to the radwaste enclosure, offgas enclosure, pipe tunnel and reactor enclosures to connections to the Condenser and Air Removal System, gaseous Radwaste System, Control Enclosure Ventilation System and to TIP System. This portion of the CAC system does not support intended functions and is not in scope for license renewal. The CAC system boundary continues from the nitrogen vaporizers to separate 24-inch and 1-inch piping connections to drywell and suppression chamber penetrations, used for inerting supply. The 24-inch piping from the penetrations also connects to the SGTS for purge supply. The primary containment inerting supply piping from the outboard isolation valves to the containment penetrations and the purge piping back to the piping to duct interface with the SGTS, including test connections, valves and instrumentation is in scope for license renewal. Also included in the license renewal scoping boundary are those portions of the nonsafety-related piping back towards the liquid nitrogen supply and interface from the integrated leak rate test compressor 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 Drawings for identification of this boundary, shown in red.

The CAC System boundary also includes piping from the 24-inch drywell, and 18-inch suppression chamber vent penetrations, through containment isolation valves to the piping to duct interfaces with the SGTS. Also included are 1-inch branch connections off the drywell and suppression chamber vent lines through containment isolation valves to the piping to duct interfaces with the SGTS. These portions of the CAC System, including test connections, valves and instrumentation are in scope for license renewal. The drywell to suppression chamber downcomers and vacuum relief valves are evaluated with the license renewal Primary Containment Structure.

The CAC System boundary also includes piping within the drywell from atmosphere sample locations to drywell penetrations. The boundary continues from drywell and suppression pool penetrations through containment isolation valves to the combustible gas analyzer packages. Also included is the return piping from the analyzer packages to the drywell and suppression chamber. The boundary includes all equipment within the analyzer packages, including sample pumps, analyzer cells, flow control and indication devices, valves and tubing. These portions of the CAC System, including test connections, valves and instrumentation are in scope for license renewal. The hydrogen and oxygen span and reagent gas bottles are short-lived components that are routinely replaced and are not subject to aging management review. The seismic racks for hydrogen and oxygen span and reagent gas bottles are evaluated within the license renewal Control Enclosure Structure. Piping from containment sample lines to the Process and Post-Accident Sampling System downstream of solenoid valves used to select the sample point, and return piping to the CAC System, are evaluated for license renewal with the Process and Post-Accident Sampling System.

The CAC System boundary also includes piping from connections off the 24-inch drywell purge piping and 24-inch drywell vent piping through containment isolation valves to the hydrogen recombiner packages and return piping to the suppression chamber. The boundary includes all equipment within the recombiner packages, including blowers, reaction chamber, water-spray coolers, reaction chambers, flow control and indication devices, valves and tubing. The piping between the supply connections from the vent and purge piping to the outboard containment isolation valves and the return piping from the outboard containment isolation valves to the containment penetrations, including valves and test connections, are in scope for license renewal. Also in scope are the return and drain piping, valves and equipment to, from, and including the recombiner packages and piping from the Residual Heat Removal System to the recombiner discharge water spray cooler. For more information, refer to the License Renewal Boundary Drawings for identification of this boundary, shown in red.

The CAC System also includes piping from containment penetrations to pressure instrumentation. Included are pressure transmitters and indicators, valves, piping and tubing back to the following containment penetrations: X-220B (Unit 1), X-229A (Unit 2), X-308, X-22, X-50A and X40E. Also included is the instrument sensing line inside the suppression chamber to penetration X-220B (Unit 1) and X-229A (Unit 2), and from the penetration to suppression chamber pressure and water level instrumentation. These portions of the CAC System, including piping, tubing, valves and instrumentation are in scope for license renewal.

All drywell and suppression chamber penetrations with connections to CAC System piping and components are evaluated for license renewal with the Primary Containment Structure.

Reason for Scope Determination

The Containment Atmosphere 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 Containment Atmosphere 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 Containment Atmosphere 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 Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), and Station Blackout (10 CFR 50.63). The Containment Atmosphere 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 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 Containment Atmosphere Control System includes containment pressure instrumentation that actuates reactor trip and actuation of Emergency Core Coolant Systems and primary and secondary containment isolation. 10 CFR 54.4 (a)(1)

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

3. Provide emergency heat removal from primary containment and provide containment pressure control. The Containment Atmosphere Control System includes flow paths from primary containment that are used to vent primary containment for pressure control. The containment vacuum relief valves operate automatically to maintain acceptable differential pressure across the diaphragm between the drywell and suppression chamber. 10 CFR 54.4 (a)(1)

4. Control combustible gas mixtures in the primary containment atmosphere. The Containment Atmosphere Control System is credited with establishing, maintaining and monitoring an inert atmosphere within primary containment during power operation. The Containment Atmosphere Control System also includes equipment that samples the containment atmosphere, provides indication of the oxygen and hydrogen concentration, and performs recombination of hydrogen 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 the nonsafety-related nitrogen supply 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 spatial interaction with safety-related equipment within the reactor enclosure. 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 Containment Atmosphere 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 Fire Protection (10 CFR 50.48). The Containment Atmosphere Control System includes instrumentation that monitors containment pressure and temperature used by operators to perform required plant transitions and essential operator actions during post-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 Station Blackout (10 CFR 50.63). The Containment Atmosphere Control System includes instrumentation that monitors containment temperature used by operators to perform required plant transitions and essential operator actions to mitigate a station blackout event. The Containment Atmosphere Control System includes motor operated primary containment isolation valves that require manual operation to close to mitigate a station blackout event. 10 CFR 54.4(a)(3)

<u>UFSAR References</u>

Table 3.2-1
Table 6.1-3
6.2.5
7.3.1.1.6.1
9.4.5.1

<u>License Renewal Boundary Drawings</u>

LR-M-42, Sheet 1
LR-M-42, Sheet 3
LR-M-52, Sheet 1
LR-M-52, Sheet 3
LR-M-57, Sheet 1
LR-M-57, Sheet 2
LR-M-57, Sheet 3
LR-M-57, Sheet 4
LR-M-57, Sheet 5
LR-M-57, Sheet 6
LR-M-58, Sheet 1
LR-M-58, Sheet 2
LR-M-58, Sheet 3
LR-M-58, Sheet 4

Table 2.3.2-1 <u>Containment Atmosphere Control System</u>
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Flow Device (Gas Analyzers - Orifices)	Pressure Boundary
	Throttle
Piping, piping components, and piping elements	Pressure Boundary
	Structural Support
Piping, piping components, and piping elements (Gas Analyzers)	Pressure Boundary
Piping, piping components, and piping elements (Recombiner)	Leakage Boundary
	Pressure Boundary
Pump Casing (Gas Analyzers)	Pressure Boundary
Pump Casing (Recombiner Blower Casing)	Pressure Boundary
Sensor Element (H2/O2 Elements)	Pressure Boundary
Valve Body	Pressure Boundary
	Structural Support
Valve Body (Gas Analyzers)	Pressure Boundary

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

Table 3.2.2-1 Containment Atmosphere Control System
Summary of Aging Management Evaluation

2.3.2.2 Core Spray System

Description

The Core Spray System is a low pressure Emergency Core Cooling System (ECCS) designed to provide cooling water for the removal of decay heat from the reactor core following a postulated Loss-of-Coolant Accident (LOCA). Large pipe breaks in the reactor coolant system result in a reactor pressure reduction sufficient to permit the Core Spray System to achieve its rated injection flow. To accommodate the remaining pipe breaks, the Automatic Depressurization System provides the initial controlled depressurization to reduce reactor pressure, and thus permit Core Spray System injection.

The purpose of the Core Spray System is to provide for the post-LOCA removal of decay heat from the reactor core for the entire spectrum of postulated LOCAs. The Core Spray System accomplishes this by delivering a low-pressure spray pattern over the core following a LOCA, satisfying the requirements of 10 CFR 50.46. The Core Spray System also provides a flow path for the High Pressure Coolant Injection (HPCI) System for the mitigation of small break LOCAs.

The Core Spray System consists of two independent and redundant core spray loops. The Core Spray System is initiated automatically by a low reactor vessel level or high drywell pressure coincident with a low reactor vessel pressure. Sufficient redundancy and diversity of initiation signals is provided to prevent a single failure from preventing automatic initiation of the Core Spray System. The Core Spray System can also be manually initiated.

The Core Spray System includes a safeguard piping fill system designed to maintain the Core Spray, Residual Heat Removal (RHR), High Pressure Coolant Injection (HPCI), and Reactor Core Isolation Cooling (RCIC) pump discharge lines in a filled condition to facilitate the rapid initiation of cooling water flow to the Reactor Vessel from these pumps and prevent water hammer. The purpose of the safeguard piping fill system is to function, if required, as a safety-related backup fill system when the nonsafety-related fill system is inoperable. It accomplishes this by directing suppression pool water, by the use of the safeguard piping fill pumps, to the Core Spray, RHR, HPCI, and RCIC pump discharge lines.

The safeguard piping fill system also provides a water source to the feedwater fill system. The feedwater fill system is a subsystem of the safeguard piping fill system and is designed to prevent the release of radioactivity through the feedwater line isolation valves. The purpose of the feedwater fill system is to prevent secondary containment bypass leakage through feedwater piping following a postulated design basis LOCA. It accomplishes this by providing suppression pool water as the water seal source for the feedwater lines. The feedwater fill system is manually initiated.

The Core Spray System includes a suppression pool cleanup system. The purpose of the suppression pool cleanup system is to maintain suppression pool water quality. The system accomplishes this by a bleed and feed method. Water is drained from the suppression pool with the suppression pool cleanup pump. This water goes to the condenser hotwell for cleanup with the condensate cleanup system. Makeup water to the suppression pool is provided by the condensate storage tank.

The Core Spray System contains components that are environmentally qualified. The Core

Spray System is credited for Fire Safe Shutdown and for Station Blackout coping.

For more detailed information see UFSAR Section 6.3.2.

Boundary

The Core Spray System license renewal scoping boundary begins at the core spray suction strainers in the suppression pool and continues through core spray suction piping and primary containment isolation valves, through the core spray pumps, and terminates at the upstream side of the core spray discharge outboard containment isolation valve (evaluated with the Reactor Coolant Pressure Boundary). The Core Spray System license renewal scoping boundary includes low flow bypass lines and full flow test lines which begin at the outlet of the core spray pumps and terminate inside the suppression pool. The low flow bypass lines and full flow test lines include primary containment isolation valves.

The safeguard piping fill portion of the Core Spray System begins at the suction of the core spray pumps and continues through the safeguard piping fill pumps suction piping, through the safeguard piping fill pumps, and terminates at the discharge piping of the Core Spray, RHR, HPCI, and RCIC system pumps. The feedwater fill portion of the safeguard piping fill system includes piping to the upstream side of the feedwater fill supply outboard containment isolation valves (evaluated with the Reactor Coolant Pressure Boundary).

The suppression pool cleanup portion of the Core Spray System begins at the suppression pool and continues through the suppression pool cleanup pump suction piping and primary containment isolation valves, through the suppression pool cleanup pump, and terminates at the connection to the Reactor Water Cleanup (RWCU) System letdown piping to the condenser hotwell. All associated piping, components and instrumentation contained within the boundaries described above are also included in the Core Spray System scoping boundary.

Also included in the license renewal scoping boundary of the Core Spray System 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 no longer in proximity to equipment performing a safety-related function, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Enclosure. 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 Core Spray System scoping boundary are the reactor coolant pressure boundary and containment isolation piping and components in the discharge portion of the system, and, the reactor coolant pressure boundary and containment isolation piping and components in the feedwater fill subsystem of the safeguard piping fill system. These reactor coolant pressure boundary and containment isolation piping and components are evaluated as part of the Reactor Coolant Pressure Boundary license renewal system.

Reason for Scope Determination

The 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 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 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 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 Core Spray System includes safety-related containment isolation valves in the core spray pump suction piping, full flow test piping, minimum flow piping, and suppression pool cleanup pump suction piping. 10 CFR 54.4(a)(1)

2. Provide emergency core cooling where the equipment provides coolant directly to the core. The Core Spray System delivers a low-pressure spray pattern over the core following a LOCA, satisfying the requirements of 10CFR50.46. The Core Spray System also provides a flow path for the High Pressure Coolant Injection (HPCI) System for the mitigation of small break LOCAs. The Core Spray System also includes a safeguard piping fill system designed to maintain the Core Spray, RHR, HPCI, and RCIC pump discharge lines in a filled condition to facilitate the rapid initiation of cooling water flow to the Reactor Vessel from these pumps and prevent water hammer. 10 CFR 54.4(a)(1)

3. Sense process conditions and generate signals for reactor trip or engineered safety features actuation. The Core Spray System provides for associated actuation and system protection logic for engineered safety features operation. 10 CFR 54.4(a)(1)

4. Provide secondary containment boundary. The feedwater fill subsystem of the safeguard piping fill system provides a water seal source to the feedwater system to prevent secondary containment bypass leakage through feedwater piping following a postulated design basis LOCA. 10 CFR 54.4(a)(1)

5. Remove residual heat from the reactor coolant system. The Core Spray System provides a means for flooding the reactor vessel to remove decay heat from the core to support alternate shutdown cooling. 10 CFR 54.4(a)(1)

6. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The Core Spray System contains nonsafety-related fluid filled lines in the Reactor Enclosure which have potential spatial interactions with safety-related SSCs. 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 Core Spray System includes valves credited as high to low pressure interfaces, relief valves to prevent the overpressurization of low pressure Core Spray System piping, and piping and components that provide for suppression pool level indication. The Core Spray System also provides an injection flowpath into the vessel for HPCI. 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 Core Spray System contains 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 primary containment isolation function of the Core Spray System is credited for Station Blackout coping. 10 CFR 54.4(a)(3)

UFSAR References

1.2.4.2.13
1.3
3.2
3.6.1.2.1.15
3.9.5.1.1.11
5.2.5
5.4.7.5
6.1.1.2
6.2.3.2.3
6.2.4.3.1.3.1.6
6.3.2.2.3
6.3.2.2.6
7.1.2.1.41
7.3.1.1.1.3
7.6.1.7
7.7.1.16.9
9A
9.3
15

License Renewal Boundary Drawings

LR-M-05, Sheet 1
LR-M-05, Sheet 3
LR-M-23, Sheet 4
LR-M-23, Sheet 7
LR-M-41, Sheet 1
LR-M-41, Sheet 4
LR-M-49, Sheet 1
LR-M-49, Sheet 2
LR-M-51, Sheet 1
LR-M-51, Sheet 3
LR-M-51, Sheet 5
LR-M-51, Sheet 7
LR-M-52, Sheet 1
LR-M-52, Sheet 2
LR-M-52, Sheet 3
LR-M-52, Sheet 4
LR-M-55, Sheet 1
LR-M-55, Sheet 2

Table 2.3.2-2 Core Spray System
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Flow Device	Leakage Boundary
	Pressure Boundary
	Throttle
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing (Core Spray)	Pressure Boundary
Pump Casing (Safeguard Fill)	Pressure Boundary
Pump Casing (Suppression Pool Cleanup)	Leakage 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 Core Spray System
Summary of Aging Management Evaluation

2.3.2.3 High Pressure Coolant Injection System

Description

The High Pressure Coolant Injection (HPCI) System is a standby high pressure Emergency Core Cooling System (ECCS) designed to ensure that the reactor fuel is adequately cooled if there is a small break in the reactor coolant pressure boundary that does not result in rapid depressurization of the reactor vessel. The HPCI System accomplishes this by delivering sufficient high pressure flow to maintain reactor pressure vessel (RPV) inventory and ensures that the reactor core remains covered. The HPCI System uses a steam turbine to drive a booster and main pump. The steam supply is from the reactor pressure vessel (RPV) upstream of the main steam isolation valves. This supports RPV depressurization to a shutdown condition with the reactor coolant pressure boundary isolated by maintaining sufficient RPV water inventory. The HPCI System continues to operate until the RPV is depressurized to the point at which low pressure coolant injection and core spray system operation can maintain core cooling. The HPCI System supplies makeup water to the RPV through one of the core spray spargers and via one of the feedwater headers to the feedwater spargers. The normal alignment of the HPCI System allows for pump suction from the nonsafety-related condensate storage tank. An alternate alignment from the suppression pool is also provided as the credited volume for HPCI pump suction when the condensate storage tank is not available.

HPCI System operation is initiated automatically by either a reactor low water level or primary containment (drywell) high pressure signal, or can be initiated manually. HPCI can be operated on DC emergency power without the need for AC emergency power. The HPCI System is a single loop system that is not single failure proof.

The HPCI System consists of the following plant systems: High Pressure Coolant Injection System and the High Pressure Coolant Injection Turbine Steam system. The HPCI System is in scope for license renewal. However, portions of the HPCI System are not required to perform intended functions and are not in scope. The HPCI System has several interfaces with other systems that are not in the license renewal boundary of the HPCI System.

For more detailed information, see UFSAR section 6.3.2.2.1.

Boundary

The HPCI System license renewal scoping boundary for water injection begins at the HPCI pump suction piping from the condensate storage tank at the outer manual shutoff valve and from the suppression pool at the suction strainers. The boundary continues through to the HPCI booster pump, main pump and the discharge flow path to the Core Spray System "B" loop injection line and the Feedwater System "A" line connections, both outside the primary containment. Included are all piping and components that supply the HPCI booster pump and the HPCI main pump. The discharge path also includes a minimum flow line to the suppression pool and a test return line to the condensate storage tank. Also included in the HPCI System boundary is the keep fill piping and valves back to the safety-related portion of the Condensate System in the Reactor Enclosure and the interface at the safeguard piping fill portions of the Core Spray System.

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

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

Included in the license renewal boundary of the HPCI System 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 no longer in proximity to equipment performing a safety-related function, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Enclosure. Included in the boundary are pressure retaining components located in the Reactor Enclosure 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 this boundary, shown in red.

HPCI System piping and components within the reactor coolant pressure boundary are evaluated as part of the Reactor Coolant Pressure Boundary license renewal system.

Reason for Scope Determination

The High Pressure Coolant Injection 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 Coolant Injection 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 Coolant Injection 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 Coolant Injection 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 emergency core cooling where the equipment provides coolant directly to the core. The High Pressure Coolant Injection System provides high pressure coolant flow to the reactor vessel. 10 CFR 54.4(a)(1)

2. Provide primary containment boundary. The High Pressure Coolant Injection System includes piping and valves that are part of the primary containment boundary. 10 CFR 54.4(a)(1)

3. Sense process conditions and generate signals for reactor trip or engineered safety features actuation. The High Pressure Coolant Injection System includes suppression pool level indication that provides signals for automatic swap of the HPCI pump suction source from the condensate storage tank to the suppression pool. 10 CFR 54.4(a)(1)

4. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The High Pressure Coolant Injection System includes nonsafety-

related water filled lines in the Reactor Enclosure that have the potential for spatial interactions (spray or leakage) or structurally interact 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 High Pressure Coolant Injection System supports Appendix R 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 High Pressure Coolant Injection System includes environmentally qualified electrical components. 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 High Pressure Coolant Injection System isolation valves are credited for coping. 10 CFR 54.4(a)(3)

UFSAR References

6.3.2.2.1

License Renewal Boundary Drawings

LR-M-55, Sheet 1
LR-M-55, Sheet 2
LR-M-56, Sheet 1
LR-M-56, Sheet 2
LR-M-56, Sheet 3
LR-M-56, Sheet 4
LR-M-41, Sheet 1
LR-M-41, Sheet 4

Table 2.3.2-3 <u>High Pressure Coolant Injection System</u>
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Flow Device	Leakage Boundary
	Pressure Boundary
	Throttle
Heat Exchanger Components (Lube Oil Cooler - shell side)	Pressure Boundary
Heat Exchanger Components (Lube Oil Cooler - tube side components)	Pressure Boundary
Heat Exchanger Components (Lube Oil Cooler - tubes)	Heat Transfer
	Pressure Boundary
Heat Exchanger Components (Lube Oil Cooler - tubesheet)	Pressure Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
	Structural Support
Pump Casing (Aux Lube Oil)	Pressure Boundary
Pump Casing (Barometric condenser vacuum pump)	Structural Support
Pump Casing (Booster Pump)	Pressure Boundary
Pump Casing (HPCI Pump)	Pressure Boundary
Pump Casing (Turbine driven lube oil pump)	Pressure Boundary
Pump Casing (Vacuum tank condensate pump)	Leakage Boundary
Sparger	Pressure Boundary
Strainer (Element)	Filter
	Pressure Boundary
Tank (Turbine Lube Oil Reservoirs)	Pressure Boundary
Tank (Vacuum Tank)	Leakage Boundary
Turbine Casings	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary
	Structural Support

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

Table 3.2.2-3 High Pressure Coolant Injection System
Summary of Aging Management Evaluation

2.3.2.4 Reactor Core Isolation Cooling System

Description

The Reactor Core Isolation Cooling (RCIC) System is a standby high pressure safety-related system designed to ensure that sufficient reactor water inventory is maintained in the reactor vessel to allow for adequate core cooling. This 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 uses a steam turbine to drive a pump. The steam supply is from the reactor pressure vessel (RPV) upstream of the main steam isolation valves. This 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 condensate or low pressure coolant injection and core spray system operation can maintain core cooling. The RCIC System supplies make-up water to the RPV via one of the feedwater headers to feedwater spargers. The normal alignment of the RCIC System allows for pump suction from the nonsafety-related condensate storage tank. An alternate alignment from the suppression pool is also provided as the credited volume for RCIC pump suction when the condensate storage tank is not available.

The RCIC System operation is initiated automatically by reactor low water level or can be initiated manually. The RCIC System is a single loop system that is not single failure proof. RCIC can be operated on DC emergency power without the need for AC emergency power.

The RCIC System consists of the following plant systems: reactor core isolation cooling system and the reactor core isolation cooling turbine steam system. The RCIC System is in scope for license renewal. However, portions of the RCIC System are not required to perform intended functions and are not in scope. The RCIC System has several interfaces with other systems that are not in the license renewal boundary of the RCIC System.

For more detailed information, see UFSAR section 5.4.6.

Boundary

The RCIC System license renewal scoping boundary for water injection begins at the RCIC pump suction piping from the condensate storage tank at the outer manual shutoff valve and from the suppression pool at the suction strainers. The boundary continues through to the RCIC pump and the discharge flow path. The discharge flow path continues from the discharge of the RCIC pump to the 'B' main feedwater line connection outside of primary containment. The discharge path also includes a minimum flow line to the suppression pool and a test return line to the condensate storage tank. Also included in the RCIC System boundary is the keep fill piping and valves back to the safety-related portion of the Condensate System in the Reactor Enclosure and the interface at the safeguard piping fill portions of the Core Spray system.

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, turbine oil, and turbine cooling water.

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 license renewal boundary of the RCIC 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. 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 piping and components associated with the RCIC barometric condenser vacuum pump. This includes the suction piping from the barometric condenser vacuum tank through the RCIC barometric condenser vacuum pump to the suppression pool. This portion of the system is not safety-related and is not required to function to support operability of the RCIC System. In addition, since this portion of the system contains gas it does not support the system's leakage boundary intended function. Therefore, this portion of the RCIC System is not required to perform an intended function and is not included in the scope of license renewal.

RCIC system components within the reactor coolant pressure boundary are evaluated as part of the Reactor Coolant Pressure Boundary license renewal system.

Reason for Scope Determination

The Reactor Core Isolation Cooling 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 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 provides high pressure coolant flow to the reactor vessel. 10 CFR 54.4 (a)(1)

2. Provide primary containment boundary. The RCIC System includes piping and valves that are part of the primary containment boundary. 10 CFR 54.4(a)(1)

3. Sense process conditions and generate signals for reactor trip or engineered safety features actuation. Provides a manual or automatic interlock function to ensure or maintain proper performance of nuclear safety functions required of safety related equipment. 10 CFR 54.4(a)(1)

4. 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 Enclosure that have the potential for spatial interactions (spray or leakage) or structurally interact 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 RCIC System supports 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 RCIC System includes environmentally qualified electrical components. 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 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

5.4.6

License Renewal Boundary Drawings

LR-M-49, Sheet 1
LR-M-49, Sheet 2
LR-M-50, Sheet 1
LR-M-50, Sheet 2
LR-M-50, Sheet 3
LR-M-50, Sheet 4
LR-M-41, Sheet 1
LR-M-41, Sheet 4

Table 2.3.2-4 Reactor Core Isolation Cooling System
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Flow Device	Leakage Boundary
	Pressure Boundary
	Throttle
Heat Exchanger Components (Lube Oil Cooler - shell side)	Pressure Boundary
Heat Exchanger Components (Lube Oil Cooler - tube side components)	Pressure Boundary
Heat Exchanger Components (Lube Oil Cooler - tubes)	Heat Transfer
	Pressure Boundary
Heat Exchanger Components (Lube Oil Cooler - tubesheet)	Pressure Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing (Barometric Condenser Pump)	Leakage Boundary
Pump Casing (RCIC Pump)	Pressure Boundary
Pump Casing (Turbine driven lube oil pump)	Pressure Boundary
Sparger	Pressure Boundary
Strainer (Element)	Filter
	Pressure Boundary
Tank (Vacuum Tank)	Leakage Boundary
Tanks (Turbine Lube Oil Reservoirs)	Pressure Boundary
Turbine Casings	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

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

Table 3.2.2-4 Reactor Core Isolation Cooling System
Summary of Aging Management Evaluation

2.3.2.5 Residual Heat Removal System

Description

The Residual Heat Removal (RHR) System is a heat removal system that also provides a low pressure Emergency Core Cooling System 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), the effective core cooling capability of LPCI is extended to all break sizes because the ADS rapidly reduces the reactor vessel pressure to the LPCI operating range.

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 restores and maintains the reactor vessel water level to prevent excessive fuel cladding temperatures and oxidation during and after a LOCA. The LPCI mode provides four pumps for delivery of water from the suppression pool to separate vessel nozzles, which lead to direct discharge inside the core shroud region. The primary purpose of LPCI is to provide vessel inventory makeup following large pipe breaks. Following ADS initiation, LPCI provides inventory makeup following small breaks.

The Shutdown Cooling (SDC) mode removes reactor core decay heat and sensible heat from the primary reactor system so that the reactor can be shut down for refueling and servicing operations.

The Suppression Pool Cooling (SPC) mode limits the suppression pool water temperature to assure that the temperature does not exceed the limit required in order for the suppression pool inventory to perform as the quenching agent for pressure suppression. SPC also limits peak suppression pool temperature long-term after a LOCA to maintain acceptable containment temperature and pressure levels.

The Containment Spray Cooling (CSC) mode provides drywell and wetwell spray so that following a LOCA, steam is condensed and non-condensable gases are cooled in the containment to maintain acceptable containment temperature and pressure levels.

The RHR System provides a flow path from the plant Residual Heat Removal Service Water system (part of the Safety Related Service Water System license renewal system) to the reactor vessel or containment via the RHR discharge lines for core cooling or containment flooding.

The RHR Alternate Decay Heat Removal (ADHR) function removes reactor core decay heat from the reactor vessel and removes spent fuel decay heat from the spent fuel pool if the combined reactor vessel and fuel pool heat loads during refueling exceed the capacity of the Fuel Pool Cooling and Cleanup (FPC) System and the RHR SDC suction line is unavailable.

The RHR System provides additional cooling capacity for the FPC System during normal plant shutdown when the RHR System is not required for the normal shutdown cooling mode or not required to be available for the LPCI mode.

The RHR System can provide a flow path for draining the suppression pool water to the Radwaste System during normal plant operation and shutdown.

The RHR System is comprised of four independent loops. Each loop contains a motor-driven pump, piping, valves, instrumentation, and controls. Each loop can take suction from the suppression pool and is capable of discharging water to the reactor for LPCI via a separate vessel nozzle or back to the suppression pool via a full flow test line. In addition, loops A and B have heat exchangers that are cooled by the Safety Related Service Water (SRSW) System. These two loops can also take suction from the reactor recirculation system suction or from the spent fuel pool during refueling and can discharge into the reactor recirculation system discharge for residual heat removal. One of these two loops can be aligned to cool the spent fuel pool. The pumps in loops C and D can be aligned via crossties for use as alternates to the pumps in loops A and B, respectively. During cold shutdown and refueling operation condition, this results in the availability of four shutdown cooling subsystems. Each RHR heat exchanger can be aligned to one of two associated RHR pumps, constituting a shutdown cooling subsystem comprised of a heat exchanger, pump, and piping flow path (A heat exchanger with A RHR pump; A heat exchanger with C RHR pump; B heat exchanger with B RHR pump; and B heat exchanger with D RHR pump).

For the Containment Spray Cooling mode of operation, the Fire Protection System is capable of being cross-tied to loop B (Unit 1) and loop A (Unit 2) RHR to provide an alternate source of water for the containment (drywell) spray mode of RHR. This cross-tie is to be used only when there is no other method of injection to containment spray. Also, the cross-tie can provide an alternate source of water that can be injected through the LPCI injection line.

In SDC mode, the plant can be shut down using the capacity of a single RHR heat exchanger and related SRSW System capability. In LPCI mode, the four loops of the LPCI subsystem inject water into the reactor vessel. Separate power sources are provided for the LPCI injection valves so that the failure of a single electrical division does not prevent the valves in other divisions from opening.

For more detailed information see UFSAR Sections 5.4.7, 6.2.1, 6.2.2, 6.3.2, and 6.5.2.

Boundary

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 residual heat removal pump. 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 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 Reactor Coolant Pressure Boundary) 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 Reactor Coolant Pressure Boundary), and to the drywell spray and suppression pool spray and return flowpaths described below. The SRSW

System (RHRSW portion) 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. Keep fill piping and valves are included up to the interface point with the Condensate System and safeguard piping fill portions of the Core Spray and Reactor Core Isolation Cooling Systems. Piping and valves in the lines interfacing with the Fuel Pool Cooling and Cleanup System are included in the RHR scoping boundary. Connections to the Containment Atmospheric Control System, Radwaste System, Compressed Air System, and Process and Post-Accident Sampling System are also provided. Associated piping, components and instrumentation contained within the flow paths described above are included within the system evaluation boundary.

Also included in the license renewal scoping boundary of the Residual Heat Removal System 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 no longer in proximity to equipment performing a safety-related function, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Enclosure. 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.

The RHR plant system includes reactor coolant pressure boundary and containment isolation piping and components in both suction and discharge flowpaths as described above. These components are evaluated as part of the Reactor Coolant Pressure Boundary license renewal system.

<u>Reason for Scope Determination</u>

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).

<u>Intended Functions</u>

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 Enclosure and Primary Containment which have the potential for spatial interaction with safety-related SSCs. A portion of the abandoned, non-fluid filled Unit 1 reactor head spray supply line is in-scope for structural support to maintain primary containment integrity. 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)

<u>UFSAR References</u>

5.4.7
6.2
6.3
6.5

<u>License Renewal Boundary Drawings</u>

LR-M-51, Sheet 1

LR-M-51, Sheet 2
LR-M-51, Sheet 3
LR-M-51, Sheet 4
LR-M-51, Sheet 5
LR-M-51, Sheet 6
LR-M-51, Sheet 7
LR-M-51, Sheet 8

Table 2.3.2-5 Residual Heat Removal System
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Flow Device	Leakage Boundary
	Pressure Boundary
	Throttle
Heat Exchanger Components (RHR heat exchanger - shell side)	Heat Transfer
	Pressure Boundary
Heat Exchanger Components (RHR pump motor cooling coil)	Heat Transfer
	Pressure Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing	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 3.2.2-5 Residual Heat Removal System
Summary of Aging Management Evaluation

2.3.2.6 Standby Gas Treatment System

Description

The Standby Gas Treatment System (SGTS) is a standby Engineered Safety Features system that filters halogen and particulate concentrations in gases potentially present in secondary containment following design basis accidents. The system automatically initiates, isolates, and maintains a negative pressure in secondary containment during these conditions.

The SGTS license renewal system consists of the plant system called the Reactor Enclosure Recirculation System (RERS) and the plant system called Standby Gas. The RERS subsystem cleans and recirculates air under accident conditions. The Standby Gas subsystem maintains a negative pressure in secondary containment under these same accident conditions, and filters the air from the RERS subsystem prior to discharge.

During normal plant operation, ventilation is provided by the Reactor Enclosure Ventilation (REV) System. Upon receipt of an automatic initiation signal, the normal REV supply and exhaust flowpaths are isolated by isolation dampers, and the SGTS is initiated. The reactor enclosure air is circulated and cleaned by the RERS subsystem. This subsystem consists of two parallel trains, each consisting of charcoal and HEPA filters, which take suction from the normal ventilation exhaust and discharge back to the normal ventilation supply ducts. In this manner, normal ventilation flowpaths are maintained. The standby gas subsystem is connected to the RERS subsystem, and takes suction downstream of the RERS filter trains. It consists of two parallel fans and filter trains, which take suction from the RERS subsystem downstream of the RERS filters, and operate to maintain a negative pressure in the secondary containment. Air is directed through the standby gas filters to remove activity prior to discharge through the North Stack.

The secondary containment consists of three distinct isolation zones. Zone I is the Unit 1 Reactor Enclosure, Zone II is the Unit 2 Reactor Enclosure, and Zone III is the common Refueling Area. Unit 1 RERS and Unit 2 RERS serve Zone I and Zone II respectively. The Standby Gas subsystem is a common system that serves all three zones. A Zone I and a Zone II isolation operate as described above, through the RERS and standby gas train alignments. Since the Refuel Floor is a common area and not connected to a Unit 1 or Unit 2 RERS subsystem, a Zone III isolation does not provide a recirculation alignment. Air is cleaned directly through the standby gas filters and discharged through the North Stack. All or any combination of the zones are automatically isolated by redundant isolation dampers upon receipt of any of the following isolation signals: high radiation in the Reactor or Refueling area exhaust ducts, low differential pressure in one of the zones, or LOCA signal. A manual isolation signal can also be initiated from the main control room.

For more detailed information, see UFSAR Sections 3.5.1.1.1, 6.2.3, 6.5, 9.4.2, and 9A.2.5.

Boundary

The SGTS license renewal scoping boundary begins at the secondary containment isolation valves, and includes the isolation and system initiation circuitry. It includes two parallel RERS circulation fan and filter trains per unit; two common unit parallel standby gas filter trains; two common unit parallel standby gas exhaust fans; associated dampers, ductwork, instrumentation and controls; and ends at the plant discharge through the North Stack.

Since the SGTS recirculates air through the same flowpath that is utilized by the Reactor Enclosure Ventilation (REV) system, both systems have some equipment in common. For the purposes of license renewal evaluation, the shared ductwork is evaluated with the SGTS System. The Reactor Enclosure area and room cooling and ventilation equipment, the steam flooding isolation dampers, and the associated controls and circuitry are evaluated with the REV System.

Also included in the license renewal scoping boundary of the SGTS are those portions of nonsafety-related piping 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. Also included in the license renewal scoping boundary of the SGTS are those portions of nonsafety-related piping that are liquid-filled and relied upon to preserve the leakage boundary intended function. This includes various ductwork and filter plenum drain lines. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the boundary of this system are the components that comprise the REV System, including the reactor enclosure air supply and air exhaust fans, reactor enclosure equipment exhaust filters, refueling area air supply and air exhaust fans, and the North Stack and South Stack rad monitoring equipment. The REV System is evaluated separately for license renewal considerations.

Also not included in the boundary of this system is the fire protection deluge system supply piping to each of the standby gas and RERS charcoal filters. The LGS design provides fire detection and suppression for the charcoal filters in all of the plant ventilation systems (Reference UFSAR 9A.2.5). Since this is a fire protection system function and not a ventilation system function, these components are administratively realigned with the Fire Protection System for evaluation under license renewal.

Also not included in the boundary of this system are the drywell purge exhaust fans and the associated ductwork and components downstream of the secondary containment isolation valves. This equipment does not perform an intended function for license renewal, and is not in scope for this 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 Fire Protection (10 CFR 50.48) and 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 Anticipated Transient Without Scram (10 CFR 50.62) and Station Blackout (10 CFR 50.63).

Intended Functions

1. Provide secondary containment boundary. The SGTS automatically isolates the secondary containment from nonradioactive environments upon receipt of a LOCA signal or other accident isolation signals. 10 CFR 54.4(a)(1)

2. Control and treat radioactive materials released to the secondary containment. The SGTS maintains a negative pressure within secondary containment, and reduces halogen and particulate concentrations in gases potentially present in the reactor enclosure following an accident. 10 CFR 54.4(a)(1)

3. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The SGTS includes nonsafety-related water filled lines in the Reactor Enclosure 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 SGTS system contains fire dampers that are required to function during a fire 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). Certain safety-related SGTS components are in located in potentially harsh environments and are environmentally qualified. 10 CFR 54.4(a)(3)

<u>UFSAR References</u>

3.5.1.1.1
6.2.3
6.5
9.4.2
9A.2.5

<u>License Renewal Boundary Drawings</u>

LR-M-76, Sheet 1
LR-M-76, Sheet 2
LR-M-76, Sheet 3
LR-M-76, Sheet 4
LR-M-76, Sheet 5
LR-M-76, Sheet 6
LR-M-76, Sheet 7
LR-M-76, Sheet 8
LR-M-76, Sheet 9
LR-M-76, Sheet 10
LR-M-56, Sheet 1
LR-M-56, Sheet 2
LR-M-57, Sheet 1
LR-M-57, Sheet 2
LR-M-57, Sheet 4
LR-M-57, Sheet 5

Table 2.3.2-6 Standby Gas Treatment System
Component Subject to Aging Management Review

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

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

Table 3.2.2-6 Standby Gas Treatment System
Summary of Aging Management Evaluation

2.3.3 AUXILIARY SYSTEMS

The following systems are addressed in this section:

- Auxiliary Steam System (2.3.3.1)
- Closed Cooling Water System (2.3.3.2)
- Compressed Air System (2.3.3.3)
- Control Enclosure Ventilation System (2.3.3.4)
- Control Rod Drive System (2.3.3.5)
- Cranes and Hoists (2.3.3.6)
- Emergency Diesel Generator Enclosure Ventilation System (2.3.3.7)
- Emergency Diesel Generator System (2.3.3.8)
- Fire Protection System (2.3.3.9)
- Fuel Handling and Storage (2.3.3.10)
- Fuel Pool Cooling and Cleanup System (2.3.3.11)
- Nonsafety-Related Service Water System (2.3.3.12)
- Plant Drainage System (2.3.3.13)
- Primary Containment Instrument Gas System (2.3.3.14)
- Primary Containment Leak Testing System (2.3.3.15)
- Primary Containment Ventilation System (2.3.3.16)
- Process Radiation Monitoring System (2.3.3.17)
- Process and Post-Accident Sampling System (2.3.3.18)
- Radwaste System (2.3.3.19)
- Reactor Enclosure Ventilation System (2.3.3.20)
- Reactor Water Cleanup System (2.3.3.21)
- Safety Related Service Water System (2.3.3.22)
- Spray Pond Pump House Ventilation System (2.3.3.23)
- Standby Liquid Control System (2.3.3.24)
- Traversing Incore Probe System (2.3.3.25)
- Water Treatment and Distribution System (2.3.3.26)

2.3.3.1 Auxiliary Steam System

Description

The intended function of the Auxiliary Steam System for license renewal is to resist nonsafety-related failure by maintaining leakage boundary integrity to preclude system interactions, and by maintaining structural support at physical interfaces with safety-related equipment. For this reason, this system's pressure retaining components located in proximity to other components performing safety-related functions, and portions of this system connected to safety-related systems are included in the scope of license renewal. This system is not required to operate to support license renewal intended functions, however portions of the system are in scope for potential spatial interaction and structural support. The Auxiliary Steam System is a normally operating system designed to provide a source of low pressure non-contaminated steam for various startup and plant service functions. The system is not safety-related. The Auxiliary Steam System (which includes the plant Heating Steam system) is designed to operate independently of the NSSS.

The purpose of the Auxiliary Steam System is to provide steam for various startup and plant service functions. The system accomplishes this using auxiliary steam boilers which are common to both Units 1 and 2. The Auxiliary Steam System consists of three water tube package boilers, a deaerator, three boiler feedwater pumps, three fuel oil pumps, a fuel oil storage tank for No. 2 oil, a chemical feed tank and pumps, and associated piping, valves, controls, and instrumentation. The major components of the Auxiliary Steam System are located in the auxiliary boiler structure, the fuel oil pump house, and the tank dike area.

The Auxiliary Steam System's boiler control is designed for typically untended operation, except for cold startup operation of a boiler. Process steam and plant heating steam are distributed from the boiler steam outlet header. Condensate recovered from the plant heating system is returned to the deaerator, which provides condensate storage. Demineralized water is used for boiler makeup. An atmospheric blowdown tank is provided to control the water quality in the boilers. A pressure reducing valve maintains plant heating steam system pressure. Final pressure reduction is accomplished, as required, by individual valves adjacent to the equipment served. Steam heating coils are provided in the auxiliary boiler mud drums to prevent freezing when the unit is not in operation. The Auxiliary Steam System can provide a backup for the clean steam seal system. The system can provide a backup for main steam to the steam jet air ejectors to support plant startup and shutdown. It also provides steam for condensate deaeration in the hotwell during plant startup. The condensate from this process is not returned to the deaerator but is drained to the main condenser. Local and remote indicators, alarms, and pressure relief valves are provided to monitor the system process and protect system components. A common boiler trouble alarm is located in the control room.

The only connections between the Auxiliary Steam System and seismic Category I systems are those used for testing of the HPCI and RCIC turbines. The connections are made through pipe spools containing spectacle flanges. After testing, the blind portion of the spectacle flange is installed and the auxiliary steam system is isolated from the seismic Category I systems. The portions of the Auxiliary Steam System piping that connect to the HPCI and RCIC steam supply lines are in the scope of license renewal with the intended function of structural support, included with leakage boundary.

The Auxiliary Steam System has no safety-related function. The system is designed so that a failure of the system or one of its components does not compromise any safety-related system or component or prevent a safe reactor shutdown.

For more detailed information, see UFSAR Section 10.4.10.

Boundary

The license renewal scoping boundary of the Auxiliary Steam System encompasses 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 no longer in proximity to equipment performing a safety-related function, whichever extends furthest. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of these portions of the system. This includes Auxiliary Steam System and plant Heating Steam System piping and components located within the Reactor Enclosures, the Emergency Diesel Generator Enclosures, the railroad airlock (part of the Reactor Enclosures), and the Auxiliary Boiler Enclosure pipe tunnel (located beneath the Auxiliary Boiler Enclosure and containing safety-related piping and components). For more information refer to the License Renewal Boundary Drawings for identification of these portions of the system, shown in red. Portions of the Auxiliary Steam System that do not connect to safety-related components and are not required for structural support, or do not include piping and components in proximity to safety-related components and do not create a potential for spatial interaction, are not included in scope.

Reason for Scope Determination

The Auxiliary Steam 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 Auxiliary 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 Auxiliary Steam 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 Auxiliary Steam System contains nonsafety-related fluid filled lines within the Reactor Enclosures, Emergency Diesel Generator Enclosures, and other locations which have the potential for spatial interaction with safety-related SSCs. Connections with safety-related HPCI and RCIC steam supply lines are in scope for structural support. 10 CFR 54.4(a)(2)

UFSAR References

10.4.10

License Renewal Boundary Drawings

LR-M-05, Sheet 1
LR-M-05, Sheet 3

LR-M-21, Sheet 1
LR-M-21, Sheet 2
LR-M-21, Sheet 3
LR-M-50, Sheet 1
LR-M-50, Sheet 2
LR-M-55, Sheet 1
LR-M-55, Sheet 2
LR-M-69, Sheet 1
LR-M-96, Sheet 1
LR-M-96, Sheet 2
LR-M-96, Sheet 5

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

Component Type	Intended Function
Bolting	Mechanical Closure
Heat Exchanger Components	Leakage Boundary
Piping, piping components, and piping elements	Leakage Boundary
Tanks	Leakage Boundary
Valve Body	Leakage Boundary

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

Table 3.3.2-1 Auxiliary Steam System
Summary of Aging Management Evaluation

2.3.3.2 Closed Cooling Water System

Description

The Closed Cooling Water (CCW) System is a normally operating closed-loop cooling system designed to provide cooling water to miscellaneous reactor auxiliary plant equipment and auxiliary plant equipment associated with nuclear and power conversion systems.

The CCW System consists of the following plant systems: Reactor Enclosure Cooling Water system and Turbine Enclosure Cooling Water system. The CCW System is in scope for license renewal. However, portions of the CCW System are not required to perform intended functions and are not in scope.

Reactor Enclosure Cooling Water (RECW) system

The purpose of the RECW plant system is to provide cooling to the following components during normal operation: Reactor Water Cleanup System non-regenerative heat exchangers, Reactor Water Cleanup System recirculating pump seal and motor coolers, reactor recirculation pump seal and motor oil coolers, reactor enclosure equipment drain sump cooler, sample station coolers, and Primary Containment Instrument Gas System compressors and aftercoolers. 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 RECW heat exchangers. The RECW plant system also provides cooling to the post accident sampling system coolers during a loss of offsite power without a LOCA, and, post-LOCA when allowed by emergency diesel generator loading.

The RECW lines to the reactor recirculation pump seal and motor oil coolers penetrate the primary containment and are provided with safety-related and environmentally qualified motor operated primary containment isolation valves. These valves can be remote manually closed from the control room. Automatic, diverse isolation signals are also provided to these valves. The primary containment isolation signals to these valves can be overridden by using key-locked bypass switches. The primary containment isolation boundary of the CCW System also includes locked closed, electrically disconnected, motor operated primary containment isolation valves associated with the Safety Related Service Water System to RECW intertie.

The nonsafety-related RECW piping inside the primary containment includes a safety-related thermal relief valve. This valve prevents postulated overpressurization of the RECW primary containment isolation boundary to address thermally induced pressurization concerns as described in Generic Letter 96-06.

Turbine Enclosure Cooling Water (TECW) system

The purpose of the TECW plant system is to provide cooling to the following components during normal operation: Condensate System pump motor oil coolers, Instrument Air System compressors and aftercoolers, Service Air system air compressors and aftercoolers, and sample station coolers. 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 TECW heat exchangers.

For more detailed information see UFSAR Sections 9.2.8 and 9.2.9.

Boundary

The CCW System license renewal scoping boundary includes those portions of the system necessary to achieve primary containment isolation. Each containment influent and effluent line in the RECW System is provided with two motor operated primary containment isolation valves located outside of the primary containment. An intertie with the Safety Related Service Water System is provided between the isolation valves. These Safety Related Service Water System interties are provided with locked closed, electrically disconnected, motor operated valves which provide outboard isolation for this portion of the primary containment penetration.

The CCW System license renewal scoping boundary also includes a safety-related thermal relief valve to prevent postulated overpressurization of the RECW primary containment isolation boundary. This valve is located inside the primary containment and is installed in the nonsafety-related RECW return piping from the reactor recirculation pump seal and motor oil coolers.

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

Included in the license renewal scoping boundary of the CCW System are those portions of nonsafety-related RECW 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 no longer in proximity to equipment performing a safety-related function, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Enclosure 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.

Also included in the license renewal scoping boundary of the CCW System are those water filled portions of nonsafety-related TECW piping and equipment located in proximity to equipment performing a safety-related function. This includes the nonsafety-related portions of the system located within the Turbine Enclosure. 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 Closed 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 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 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 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 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 CCW System contains nonsafety-related water filled lines in the Reactor Enclosure, Primary Containment, and Turbine Enclosure 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 System contains components that are environmentally qualified. 10 CFR 54.4(a)(3)

UFSAR References

1.2.4
1.13
3.2
6.2.4
9.1.3
9.2.1
9.2.2
9.2.6
9.2.8
9.2.9
9.4.5

License Renewal Boundary Drawings

LR-M-10, Sheet 2
LR-M-10, Sheet 7
LR-M-13, Sheet 1
LR-M-13, Sheet 2
LR-M-14, Sheet 1
LR-M-14, Sheet 2
LR-M-23, Sheet 4
LR-M-23, Sheet 7
LR-M-26, Sheet 1
LR-M-26, Sheet 2
LR-M-26, Sheet 7
LR-M-26, Sheet 8
LR-M-30, Sheet 1
LR-M-30, Sheet 2
LR-M-43, Sheet 1
LR-M-43, Sheet 3
LR-M-44, Sheet 1
LR-M-44, Sheet 2
LR-M-44, Sheet 3
LR-M-44, Sheet 4

LR-M-59, Sheet 2
LR-M-59, Sheet 4
LR-M-61, Sheet 2
LR-M-61, Sheet 5
LR-M-64, Sheet 1
LR-M-87, Sheet 4
LR-M-87, Sheet 9

Table 2.3.3-2 Closed Cooling Water System
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Flexible Connection	Leakage Boundary
Heat Exchanger Components ("A" Reactor Water Cleanup Recirculation Pump Motor Cooler Tube Side Components)	Leakage Boundary
Heat Exchanger Components ("B" and "C" Reactor Water Cleanup Recirculation Pump Seal Cooler Shell Side Components)	Leakage Boundary
Heat Exchanger Components (Instrument Gas Compressor Aftercooler Shell Side Components)	Leakage Boundary
Heat Exchanger Components (Process Radiation Monitor Sample Cooler Shell Side Components)	Leakage Boundary
Heat Exchanger Components (Reactor Enclosure Cooling Water Heat Exchanger Shell Side Components)	Leakage Boundary
Heat Exchanger Components (Reactor Recirculation Pump Seal Cooler Shell Side Components)	Leakage Boundary
Heat Exchanger Components (Reactor Water Cleanup Non-Regenerative Heat Exchanger Shell Side Components)	Leakage Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing (Reactor Enclosure Cooling Water Pumps)	Leakage Boundary
Tanks (Head Tank and Chemical Addition Tank)	Leakage Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

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

Table 3.3.2-2 Closed Cooling Water System
Summary of Aging Management Evaluation

2.3.3.3 Compressed Air System

Description

The Compressed Air System is a mechanical system designed to supply plant equipment with compressed air and gas, and supply service air outlets located throughout the plant with compressed air. The system is comprised of plant station air systems consisting of the plant Instrument Air system, Service Air system, and Condensate Filter Demineralizer Backwash Air Supply system. The Primary Containment Instrument Gas System is included in the scope of license renewal as a separate system and is not discussed with the Compressed Air System. The Compressed Air 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 Perkiomen and Schuylkill compressed air systems, which supply compressed air for equipment associated with the Perkiomen Creek Intake and Schuylkill River Intake Structures, do not provide intended functions, and are also not in scope.

The purpose of the Compressed Air System is to provide a supply of compressed air or gas for operation of pneumatic devices located throughout the plant. It accomplishes this by drawing, compressing, and conditioning gas (air) through use of compressors, filters, moisture separators, receivers, and dryers, and also through the use of compressed nitrogen supply bottles for specific applications as described below. The instrument air, service air, and condensate filter demineralizer backwash air systems have no safety-related function other than the service air portion's containment isolation and secondary containment boundary functions. With the exception of the containment penetration piping and valves, and the nitrogen supply components that provide backup inflation to refueling floor inflatable seal numbers 1, 2, 3, 4, 7, and 10 in each unit, failure of any of the Compressed Air System components does not compromise any safety-related system or component or prevent safe shutdown of the plant. The piping and components that do not perform intended functions are not in scope of license renewal.

The instrument air portion of the Compressed Air System includes two identical 100 percent capacity trains for each unit, each train consisting of a compressor, filters, cooler and moisture separator, dryer, and receiver. Each train operates automatically to maintain the desired system pressure, and each unit's system can be backed up by the other unit's system, and by the service air portion of the system described below. Pneumatically operated plant valves and dampers which have a safety-related function are either designed to fail in the safe position upon loss of air pressure or are provided with local air reservoirs.

The service air portion of the Compressed Air System includes one 100 percent capacity train for each unit, plus a common backup train, each train consisting of a compressor, filter, cooler and moisture separator, and receiver. The train either operates continuously or on automatic standby, and starts or stops on system pressure signals. Each unit's train acts as a backup to the other, and the common backup train can supply either unit in case of loss of service air.

Portions of the service air system have intended functions for license renewal. The line in each unit that penetrates containment has manual normally closed valves for containment isolation. Also, service air provides air to the inflatable seals at the refueling floor of the reactor enclosures. The Unit 1 and 2 inflatable seal numbers 1, 2, 3, 4, 7, and 10 provide a secondary containment boundary. Gas bottles of nitrogen are provided as a backup supply source for operational reliability of the inflatable seals, and are automatically connected to each seal supply header in the event of low pressure in the service air line.

The condensate filter demineralizer backwash air supply portion of the Compressed Air System includes two air compressors and a receiver assembly in each unit to supply backwash air to the condensate filter demineralizer vessels. These compressors are operated manually or automatically as required.

For more detailed information, See UFSAR Section 9.3.1.

Boundary

The Compressed Air System license renewal scoping boundary includes the piping and valves comprising the primary containment boundary for each unit. It also includes the nitrogen backup supply piping and components associated with fuel floor inflatable seal numbers 1, 2, 3, 4, 7, and 10 for each unit. For each inflatable seal, this boundary begins with the nitrogen supply bottle and includes the piping, valves, and components up to the hose connection included with the inflatable seal. This boundary ends at (and includes) the check valve at the connection to the balance of the service air portion of the system for each seal. The inflatable seal components are evaluated with the Reactor Enclosure Structure.

Also included in the license renewal scoping boundary are those gas-filled portions of nonsafety-related piping and components 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 Drawings for identification of this boundary, shown in red.

Not included in the scope of license renewal for this system are the compressors, filters, cooler and moisture separators, dryers, receivers, piping, instrumentation, and components not included within the boundaries described above.

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 Compressed Air System includes safety-related containment isolation valves. 10 CFR 54.4(a)(1)

2. Provide motive power to safety-related components. The Compressed Air System provides a supply of nitrogen gas for pressurization of the inflatable seals relied upon for preservation of the secondary containment boundary. 10 CFR 54.4(a)(1)

3. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The Compressed Air System contains nonsafety-related gas-filled lines relied upon to preserve the structural support intended function of the system. 10 CFR 54.4(a)(2)

UFSAR References

9.3.1
9.3.1.2

License Renewal Boundary Drawings

LR-M-15, Sheet 15
LR-M-15, Sheet 16
LR-M-15, Sheet 29
LR-M-15, Sheet 30

Table 2.3.3-3 <u>Compressed Air System</u>
Component Subject to Aging Management Review

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

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 Enclosure Ventilation System

Description

The Control Enclosure Ventilation (CEV) System is a normally operating mechanical system common to Units 1 and 2, that provides ventilation, cooling, and control of environmental conditions in the Control Enclosure to maintain operability of safety-related equipment; and provides control of environmental conditions in the main control room for the safety and comfort of operating personnel. The CEV System is comprised of the following subsystems: Main Control Room (MCR) HVAC system, the Control Room Emergency Fresh Air Supply (CREFAS) system, the Emergency Switchgear and Battery Rooms HVAC and Battery Rooms Exhaust system, the Auxiliary Equipment Room HVAC system, the Standby Gas Treatment System (SGTS) Equipment Compartment HVAC system, Control Enclosure HVAC from the Turbine Enclosure HVAC system, the Fire Safe Shutdown (FSSD) diesel generator, and the Control Enclosure Chilled Water system (CECW). The CEV System is in scope for license renewal. However, portions of the CEV System are not required to perform intended functions and are not in scope.

The MCR HVAC subsystem is designed to maintain space temperature, relative humidity, and ventilation for Control Room habitability, personnel comfort, and equipment and instrument operation under normal and accident conditions. This subsystem also monitors for radiation levels, chlorine chemical releases, and offsite toxic chemicals in the outside air intake; isolates and provides a dedicated fresh air supply to the main control room as necessary in response to radiation, chlorine, or toxic chemical detection; and reroutes outside air and return air through filtration units as required. This subsystem maintains a positive pressure in the control room to inhibit the infiltration of air from surrounding areas, and also provides for purging affected areas of smoke during a fire.

The CREFAS subsystem is activated automatically by detection of radiation or chlorine, or manually by detection of offsite toxic chemicals at the MCR HVAC outside air intake. It is designed to provide filtration for control room fresh air and recirculated air during a high radiation accident, and to provide filtration for control room recirculated air during a chlorine or offsite toxic chemical release accident to maintain control room habitability. The system maintains a positive pressure above atmospheric during a radiation isolation to inhibit air leakage into the control room areas.

The Emergency Switchgear and Battery Rooms HVAC and Battery Rooms Exhaust subsystem is designed to provide ventilation and cooling for the Class 1E switchgear, batteries, inverters, and chilled water pump motors for both units under normal and abnormal station conditions, and to provide exhaust for the battery compartment air during normal operation. The battery room exhaust fans are not in license renewal scope.

The Auxiliary Equipment Room HVAC subsystem serves the auxiliary equipment room, remote shutdown room, computer room, control enclosure fan rooms, SGTS access area, and SGTS room to ensure the operability of equipment in these areas. This subsystem provides cooling to these areas, as well as humidity control, filtration and heating. This subsystem also provides for purging affected areas of smoke from a fire.

The SGTS Equipment Compartment HVAC subsystem is designed to filter exhaust ventilation from the SGTS equipment compartment during normal plant operation. The SGTS access area unit coolers are designed to provide emergency cooling for the SGTS equipment compartment during SGTS operation under emergency conditions. The SGTS Equipment Compartment HVAC subsystem is designed to maintain temperatures in the spaces within a range suitable for equipment performance, and to maintain adequate air flow for ventilation. Normal ventilation air for the SGTS equipment compartment is supplied from the auxiliary equipment HVAC system. The exhaust air is treated by a redundant, charcoal filtered, ventilation exhaust system prior to being discharged to the atmosphere. The exhaust air fan and filtration portion of this subsystem are not in license renewal scope, except for those components (piping, valves, temperature sensors) that provide a fire protection function and the filter plenum drain lines.

The Control Enclosure HVAC from the Turbine Enclosure HVAC subsystem provides ventilation to various nonsafety-related areas in the Control Enclosure via the Turbine Enclosure HVAC System. This subsystem includes steam flooding dampers to isolate the Control Enclosure in the event of a steam line break within the Turbine Enclosure. The only portions of this subsystem that are in the scope of license renewal are the steam flooding dampers and associated components.

The FSSD Diesel Generator is a dedicated mobile component that provides power to portable fans to provide ventilation to the areas served by the Main Control Room and the Auxiliary Equipment Room HVAC subsystems during a Fire Safe Shutdown event. The subsystem consists of a portable diesel generator, and eight portable fans and associated motors.

The Control Enclosure Chilled Water (CECW) System provides chilled water to various coolers which maintain the appropriate ambient air temperatures in the main control room, auxiliary equipment room including the computer room, emergency switchgear compartment, battery room and SGTS compartment and access area. The CECW subsystem is cooled by the Safety Related Service Water system.

For more detailed information, see UFSAR Sections 3.5.1.1.1, 6.4.1, 9.4.1, 9A.3.2.2 (Item 33), and 9.2.10.

<u>Boundary</u>

The CEV System license renewal scoping boundary begins at the outside air intake plenum. The intake plenum is equipped with chlorine detectors, toxic gas detectors, and radiation monitors. The chlorine and toxic gas detectors are part of the CEV system; however, the radiation monitors are part of the Process Radiation Monitoring System. From the intake plenum, the CEV system includes the control room supply air handling units (including cooling coils, fans, humidifiers, and electric heaters); the CREFAS high efficiency air filtration trains (each consisting of prefilter, HEPA filter, electric heating coil, carbon adsorber, a second HEPA filter, and fan); control room return air fans; aux equipment room supply air units and return air fans; SGTS room and SGTS area unit coolers and electric heaters; emergency switchgear and battery room supply air handling units; associated ductwork to and from rooms within the Control Enclosure; and associated dampers and system controls. The CEV System license renewal scoping boundary ends at the discharges through the North Vent Stack and the roof vent.

The CEV System license renewal scoping boundary also includes the toxic gas analyzer skids; the FSSD diesel generator and associated fans and motors; and the control enclosure steam flooding dampers and associated instrumentation and controls. Finally, the CEV System license renewal scoping boundary includes the CECW subsystem components, consisting of chillers skids (each consisting of a compressor, condenser, evaporator, pump-out unit, oil pump, oil heater, refrigerant piping, controls), chilled water circulating pumps, head tanks, chemical feed tanks, and associated piping and controls.

Also included in the license renewal scoping boundary of the CEV System are those portions of nonsafety-related piping and equipment located within the Control Enclosure that are liquid-filled, and relied upon to preserve the leakage boundary intended function of this portion of the system. This includes chilled water subsystem components, and various ductwork and filter plenum drain lines. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

The battery room exhaust fans, the SGTS room ventilation exhaust system (except for the plenum drain lines), and the toilet room air exhaust fan are not required to support intended functions and are not included within the scope of license renewal.

Not included in the boundary of this system is the fire protection deluge system supply piping to each of the CREFAS and the SGTS room ventilation exhaust charcoal filter beds. The LGS design provides fire detection and suppression for the charcoal filters in all of the plant ventilation systems (Reference UFSAR 9A.2.5). Since this is a fire protection system function and not a ventilation system function, these components are administratively realigned with the Fire Protection System for evaluation under license renewal.

<u>Reason for Scope Determination</u>

The Control Enclosure 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 Enclosure 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 Control Enclosure 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 Enclosure 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).

<u>Intended Functions</u>

1. Provide a centralized area for control and monitoring of nuclear safety-related equipment. The primary purpose of the CEV System is to maintain environmental conditions and ensure the safety and comfort of operating personnel in the main control room. The system also monitors for radioactive contamination and chlorine in the outside air intake; and isolates the main control room ventilation 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 CEV System maintains environmental conditions to ensure that the operability of safety-related equipment located in the Control Enclosure is maintained. The system also isolates the Control Enclosure in the event of a steam line break in the Turbine Enclosure. 10 CFR 54.4(a)(1)

3. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The toxic gas analyzers are provided to support Control Room Habitability by monitoring for toxic gas contamination in the outside air intake. 10 CFR 54.4(a)(2)

4. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The CEV System contains nonsafety-related liquid filled piping in the Control Enclosure which has 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). A mobile diesel generator provides power to portable fans to provide temporary ventilation to areas in the Control Enclosure should the installed ventilation system become unavailable due to fire damage. 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 SGTS access area unit cooler temperature elements and the SGTS room unit cooler differential pressure instruments 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 CEV System is relied upon to provide temperature control for the main control room and the aux equipment room during a SBO event. 10 CFR 54.4(a)(3)

<u>UFSAR References</u>

3.5.1.1.1
6.4
6.5.1.2
7.3.2
9.2.10.2
9.4.1
9A.2.5
9A.3.2.2

<u>License Renewal Boundary Drawings</u>

LR-M-78, Sheet 1
LR-M-78, Sheet 2
LR-M-78, Sheet 3
LR-M-78, Sheet 4
LR-M-90, Sheet 1
LR-M-90, Sheet 2

Table 2.3.3-4 <u>Control Enclosure Ventilation System</u>
Component Subject to Aging Management Review

Component Type	Intended Function
Accumulator	Pressure Boundary
Bolting	Mechanical Closure
Ducting and Components	Leakage Boundary
	Pressure Boundary
Flexible Connection	Pressure Boundary
Flow Device	Leakage Boundary
Heat Exchanger Components (Chiller Compressor Oil Cooler Shell Side)	Leakage Boundary
Heat Exchanger Components (Chiller Condenser Shell Side Components)	Pressure Boundary
Heat Exchanger Components (Chiller Condenser Tube Sheet)	Pressure Boundary
Heat Exchanger Components (Chiller Condenser Tubes)	Heat Transfer
	Pressure Boundary
Heat Exchanger Components (Chiller Evaporator Shell Side Components)	Pressure Boundary
Heat Exchanger Components (Chiller Evaporator Tube Sheet)	Pressure Boundary
Heat Exchanger Components (Chiller Evaporator Tubes)	Heat Transfer
	Pressure Boundary
Heat Exchanger Components (MCR, AER, and Emerg Switchgear/Batt Rm Unit Cooler Air Side Components)	Pressure Boundary
Heat Exchanger Components (MCR, AER, and Emerg Switchgear/Batt Rm Unit Cooler Tubes)	Heat Transfer
	Pressure Boundary
Heat Exchanger Components (SGTS Access Area and Room Unit Cooler Air Side Components)	Pressure Boundary
Heat Exchanger Components (SGTS Access Area and Room Unit Cooler Tubes)	Heat Transfer
	Pressure Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing (Chiller Compressor Crankcase, Oil Pump)	Leakage Boundary
Pump Casing (Control Encl. Chilled Water Circ. Pumps)	Pressure Boundary

Component Type	Intended Function
Pump Casing (Toxic Gas Analyzer Pumps)	Pressure Boundary
Tanks (CECW Head Tanks)	Pressure Boundary
Tanks (Chemical Feed Tanks)	Leakage Boundary
Tanks (Economizer)	Pressure Boundary
Tanks (MCR and AER Rm Humidifier Pan)	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 Enclosure Ventilation System
Summary of Aging Management Evaluation

2.3.3.5 Control Rod Drive System

Description

The Control Rod Drive 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 Redundant Reactivity Control System. The Control Rod Drive System also incrementally positions control rods in response to signals from the Reactor Manual Control System. The Control Rod Drive 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 Control Rod Drive System is to rapidly insert negative reactivity into the reactor core to shut down the reactor under accident or transient conditions by simultaneously inserting all control rods. The Control Rod Drive 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 Control Rod Drive 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, Redundant Reactivity Control System and the Reactor Manual Control System. The Control Rod Drive System also supplies a low flow rate of cool, clean, high pressure purge water to the reactor recirculation pump seals and Reactor Water Cleanup System pump motors, and makeup to the Nuclear Boiler Instrumentation System reactor water level reference leg condensing chambers.

The Control Rod Drive System is comprised of the control rod drive mechanisms, control rod drive hydraulic system and the scram air header. Each control rod drive mechanism is a double acting, mechanically latched, hydraulic cylinder that uses reactor grade water as the operating fluid. Control rod drive mechanisms are capable of inserting or withdrawing the attached control rod blade at a slow rate, as controlled by the Reactor Manual Control System, as well as at a rapid insertion rate as controlled by the Reactor Protection System or Redundant Reactivity Control System in response to a transient or accident. A latching mechanism allows a drive to be positioned during stroking and maintains the control rod blade in a fixed position. Each control rod drive mechanism is an integral unit mounted vertically inside a housing, welded to a stub tube, which is welded into a reactor vessel bottom head penetration. The lower end of each housing terminates in a flange for attaching the insert and withdrawal piping connections from the hydraulic control unit.

The control rod drive hydraulic system includes two control rod drive water pumps, filters, valves, tanks, piping components and associated instrumentation. The pump suction from the Condensate System includes a common suction filter. A line from the discharge of each pump to the condensate storage tank provides minimum flow protection. The common pump discharge flows through parallel drive water filters, a flow control station, to the hydraulic control units via the charging water header, the drive water header, and the cooling water header, each at a different pressure. The charging water header maintains the hydraulic control unit accumulators charged and ready for service in the event of a scram signal. Stored energy available from the nitrogen charged accumulators and from reactor pressure provide hydraulic power for rapid simultaneous insertion of all 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.

The control rod drive hydraulic system is arranged so that the equipment supporting each control rod drive mechanism is packaged into modular hydraulic control units, one hydraulic control unit module for each control rod drive mechanism. The hydraulic control units receive electrical control signals from the Reactor Manual Control System or Reactor Protection System and direct water to and from the control rod drive mechanisms to move the control rods accordingly. Water exhausted from the control rod drive mechanisms is returned through the hydraulic control units to the exhaust water header and to the reactor vessel via the other hydraulic control units. Each hydraulic control unit has its own separate components to support the scram function and control rod movement during normal operations.

The scram air header provides pneumatic supply to scram pilot solenoid valves, scram discharge volume vent and drain valve actuators, and the hydraulic system flow control valve actuators. The scram air header is supplied by two redundant instrument air system supplies from the Compressed Air System. Solenoid valves on the scram air header de-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 an Alternate Rod Injection signal from the Redundant Reactivity Control System. During a scram, scram pilot solenoid valves de-energize to open scram inlet and outlet valves on each hydraulic control unit to permit stored energy in the hydraulic control unit accumulators to supply high pressure water to the drive mechanisms causing the control rods to rapidly insert.

During a scram, each hydraulic control unit discharges water from the 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. The scram discharge volume is maintained vented and drained during normal plant operation and following reset of the scram signal.

The Control Rod Drive System also provides a continuous flow of cool, high pressure water to the Reactor Recirculation System pump seal purge and Reactor Water Cleanup System pump and motor purge. The Control Rod Drive System also provides makeup water to the Nuclear Boiler Instrumentation System reactor water level instrumentation condensing chambers and reference legs. Also included within the Control Rod Drive System is an instrument sensing line to the Reactor Coolant Pressure Boundary that provides a reference to reactor pressure above the core plate for use with Control Rod Drive System differential pressure indication.

On Unit 2 permanent control rod friction test valves are connected to the drive water header to measure the friction of the control rods during rod movement. These valves are manually isolated from the Control Rod Drive System except when friction testing is being performed.

For more detailed information, see UFSAR Section 4.6.

<u>Boundary</u>

The Control Rod Drive System license renewal scoping boundary for Unit 1 begins where the common control rod drive pump discharge piping penetrates the reactor enclosure. For Unit 2, the scoping boundary begins where the common pump discharge piping penetrates the auxiliary boiler tunnel prior to penetrating the reactor enclosure. Upstream piping and components in the turbine and radwaste enclosures do not perform intended functions and are not in scope. The boundary continues to the drive water filters, branch connection to the charging water header, branch connections to the Reactor Water Cleanup System pump and motor purge and Reactor Recirculation Pump System pump seal purge, flow control station, drive water header to the hydraulic control units, drive water pressure control station, stabilizing valves, pressure equalization station, and cooling water header to the hydraulic control units and to the control rod drive mechanism flanges. Also included is the exhaust water header from the hydraulic control units back to the pressure equalizing valves. The boundary includes the charging water header to the hydraulic control unit accumulators and through the scram inlet valves to the control rod drive mechanisms. Also included is piping from the control rod drive mechanism flanges back through the scram outlet valves through the scram discharge volume, including the scram instrument volume, level instruments and vent and drain valves. Piping downstream of the outboard scram discharge volume drain valve is evaluated with the license renewal Fuel Pool Cooling and Cleanup System. All associated piping, components and instrumentation contained within the flow paths described above are included in the Control Rod Drive System boundary.

The Control Rod Drive System boundary includes the piping and components associated with the recirculation pump seal purge supply from the branch connection off the control rod drive pump discharge up to the excess flow check valves. Piping downstream of the excess flow check valves is evaluated with the license renewal Reactor Coolant Pressure Boundary. Also included is the piping and components downstream of the branch connection to the reactor water cleanup pump motors up to the first shutoff valve. Downstream piping is evaluated with the license renewal Reactor Water Cleanup System. Also included is the branch connection piping and components that provide makeup water to the reactor water level instrumentation condensing chambers and reference legs up to the outboard isolation check valves. Piping downstream of the outboard check valves is evaluated with the license renewal Reactor Coolant Pressure Boundary. Also included is the above core plate pressure sensing instrument line from the drive water pressure differential pressure indicator back to the excess flow check valve. Piping upstream of the excess flow check valve is evaluated with the license renewal Reactor Coolant Pressure Boundary. Also included, on Unit 2, are the control rod friction test valves and associated piping connected to the drive water header.

The control rod drive mechanisms are in scope for license renewal however, they are active components and therefore not subject to aging management review. The scram air header is nonsafety-related, does not have an intended function, and is not in scope. The solenoid valves that operate the scram inlet and outlet valves, scram discharge volume vent and drain valves and vent the scram air header have an active safety-related function and are in scope for license renewal. These solenoid valves do not have pressure-retaining or other passive intended function; therefore they are not subject to aging management review, and are not colored on the boundary drawings. The skids for ultrasonic cleaning and flushing of control rod drive mechanisms do not perform intended functions and since they are located within the enclosed CRD flush room they do not have the potential for spatial interaction with safety-related equipment and are therefore not in scope for license renewal.

Included in the license renewal scoping boundary are those water filled portions of nonsafety-related piping and equipment located in proximity to equipment performing a safety-related function. This includes the nonsafety-related portions of the system located in the reactor enclosures and auxiliary boiler tunnel. 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 Control Rod Drive System boundary are the control rod drive housings and stub tubes that are evaluated with the Reactor Pressure Vessel.

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. Provide reactor coolant pressure boundary. Piping components from the control rod drive mechanisms through components at the hydraulic control units, including the scram inlet and outlet valves, directional control valves and piping back to the dual isolation check valves from the cooling water, charging water, drive water and exhaust water headers are part of the reactor coolant pressure boundary. 10 CFR 54.4(a)(1)

2. Introduce negative reactivity to achieve or maintain subcritical reactor condition. The hydraulic control units 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)

3. Provide primary containment boundary. The dual isolation check valves from the control rod drive cooling water, charging water, drive water and exhaust water headers provide containment isolation function from the reactor coolant pressure boundary at the control rod drive mechanisms. The automatic vent and drain valves on the scram discharge volume provide automatic containment isolation function during a scram event. 10 CFR 54.4(a)(1)

4. 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. 10 CFR 54.4(a)(1)

5. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The Control Rod Drive System includes nonsafety-related water filled, pressure retaining piping and equipment within the reactor enclosure and auxiliary boiler tunnel that have the potential for spatial interaction with safety-related equipment. 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 Fire Protection (10 CFR 50.48). The Control

Rod Drive System includes equipment that is credited by Fire Safe Shutdown analysis to shutdown the reactor via the scram function, and prevents uncontrolled loss of reactor coolant via a high to low pressure interface, caused by a single fire event. 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 Environmental Qualification (10 CFR 50.49). The Control Rod Drive System includes equipment that is required to be environmentally qualified. 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 Anticipated Transient Without SCRAM (10 CFR 50.62). The Control Rod Drive System includes equipment that receives signals from the Redundant Reactivity Control System to provide an alternate means of venting the scram air header and cause insertion of control rods. 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 station blackout analysis credits the Control Rod Drive System with successfully inserting all control rods upon receipt of scram initiation signals from the Reactor Protection System. 10 CFR 54.4(a)(3)

<u>UFSAR References</u>

4.6
6.2.4.3.1.2.3
7.5.1.4.2.1.1
Table 3.2-1

<u>License Renewal Boundary Drawings</u>

Unit 1:
LR-M-42, Sheet 1
LR-M-42, Sheet 5
LR-M-43, Sheet 1
LR-M-46, Sheet 1
LR-M-47, Sheet 1

Unit 2:
LR-M-42, Sheet 3
LR-M-42, Sheet 6
LR-M-43, Sheet 3
LR-M-46, Sheet 2
LR-M-47, Sheet 2

Table 2.3.3-5 Control Rod Drive System
Component Subject to Aging Management Review

Component Type	Intended Function
Accumulator	Pressure Boundary
Bolting	Mechanical Closure
Flow Device (Flow Elements)	Leakage Boundary
Flow Device (Flow Glasses)	Leakage Boundary
Flow Device (Orifices)	Leakage Boundary
	Throttle
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Piping, piping components, and piping elements (Filter/Strainer Housings)	Leakage Boundary
Rupture Disks	Pressure Boundary
Sensor Element	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary
Valve Body (Check Valves)	Pressure Boundary
Valve Body (Relief Valves)	Leakage Boundary

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

Table 3.3.2-5 Control Rod Drive System
Summary of Aging Management Evaluation

2.3.3.6 Cranes and Hoists

Description

Cranes and Hoists is comprised of load handling bridge cranes, jib cranes, lifting devices, monorails, and hoists provided throughout the facility to support operation and maintenance activities. The system includes the cranes and hoists required to comply with the requirements of NUREG-0612, “Control of Heavy Loads at Nuclear Power Plants”, and hoists for handling light loads. Major cranes include the reactor enclosure crane and the turbine enclosure cranes.

The purpose of Cranes and Hoists is to safely move material and equipment supporting operations and maintenance activities. The Cranes and Hoists accomplish this by compliance with NUREG-0612 and administrative controls so damage from a heavy load drop does not prevent safe shutdown of the reactor.

The reactor enclosure 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, new fuel and spent fuel casks. The reactor enclosure 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.

The turbine enclosure cranes service the turbine-generator operating floor and are used to lift loads to support turbine repairs or maintenance. These cranes are designed as Seismic Category II.

Included in the evaluation boundary of Cranes and Hoists are load handling systems in various areas of the facility. Cranes and hoists that are in the scope of NUREG-0612 are in scope for license renewal. Other cranes and hoists that are not in the scope of NUREG-0612, but travel in the vicinity of safety-related systems, structures, and components (SSCs) are also in scope for license renewal, if it is determined that their failure could impact a safety-related function. As a result, the following cranes and hoists are in scope for license renewal:

- Reactor Enclosure Crane
- RWCU Filter Demineralizer Hoists
- HVAC Equipment Hatch Hoist
- Reactor Enclosure Equipment Hatch Hoist
- Recirculation Pump Motor Hoists
- HPCI/RCIC Equipment Hoists
- Core Spray Pump Hoists
- Reactor Enclosure Cooling Water Heat Exchanger Hoists
- RHR Pump Hoists
- CRD Hatch Area Jib Hoists
- Containment Equipment Door Hoists
- Personnel Lock Hoists
- Disposal Cask Cart Removal Hoists
- Containment Hydrogen Recombiner Cover Hoists
- Reactor Equipment Hatch Bridge Cranes
- CRD Maintenance Area Cranes

- Diesel Generator Enclosure Cranes
- Spray Pond Pump House Hoists

The boundary for Cranes and Hoists is limited to load bearing structural components such as, the bridge, trolley, rail system (rails, rail clips, and rail fasteners), structural bolts, lifting devices, monorail beams, and jib crane structural members.

The following locations for hoists utilize beams and structural supports for temporary hoist installation that are in scope for license renewal:

- Control Room Chiller Portable Gantry Hoist Monorail
- Control Room HVAC Lift Beams
- CRD Platform Hoist Monorails
- Control Structure Fans Lifting Beams
- MSRV Service Hoist Monorails
- MSRV Removal Hoist Monorails
- Steam Tunnel Monorails
- Wetwell Monorails
- Reactor Enclosure Upper Fan Room Monorails
- Reactor Enclosure Lower Fan Room Monorails

Cranes and hoists that were determined not in scope for license renewal are:

- Reactor Feed Pump Area Bridge Cranes
- Turbine Enclosure Cranes
- Condensate Pump Bridge Cranes
- Condensate Filter Demineralizer Hoists
- Recombiner Service Hoists
- Pre-heater Removal Hoists
- Reactor Feed Pump Turbine Lube Oil Pump Hoists
- Turbine Enclosure Aux. Equipment Hatch Hoists
- Condensate Filter Demineralizer Holding Pumps Hoists
- Main Lube Oil Tank Hoists
- Recirculation Pump M-G Set Hoists
- Drywell Chiller Hoists
- Drywell Chiller Hatch Hoists
- Hot Machine Shop Monorail Hoists
- CRD Pump Hoists
- Radwaste Handling Crane
- Product Cylinder and Pipeway Hoist
- Radwaste Building HVAC Hoists
- Radwaste Equipment Hatch Hoists
- Radwaste Demineralizer and Equipment Hoists
- Machine Shop Bridge Crane
- Circulating Water Building Bridge Crane
- Machine Shop Decontamination Area Bridge Crane
- Auxiliary Boiler Building Hoist
- HEPA Filter Hoist
- Schuylkill River Bulk-head Hoist

- Feedwater Heater Tube Bundle Hoists
- Turbine Enclosure M-G Set Area Supply Air Cooling Coils Hoists
- Turbine Enclosure Equipment Hatch Material Handling Hoists
- 23 Line Service Hoist
- Special Purpose Hoist Turbine Building 23 Line Crane Bay
- Water Processing Facility Crane
- Hot Shop Jib Hoist
- Radwaste Equipment and Demineralizer Hoist
- Construction Building Shop Hoists
- GML Maintenance Shop Hoist
- Turbine Deck Box Beam Cranes

Failure of these cranes and hoists does not impact a safety-related intended function.

Personnel lifts, pump up hydraulic lifts, two-man and one-man lifts are portable equipment and are not in scope for license renewal. Not included in the evaluation boundary of Cranes and Hoists are the refueling platform, fuel floor auxiliary platform, and jib cranes and hoists used for new and spent fuel handling and maintenance activities within the spent fuel pool and reactor well that are separately evaluated with the Fuel Handling and Storage System. The overhead crane or hoist structural support concrete, steel and crane runway girders are evaluated with the structure serviced by the crane.

For more detailed information, refer to UFSAR Sections 9.1.4 and 9.1.5.

<u>Boundary</u>

Not Required.

<u>Reason for Scope Determination</u>

The Cranes and Hoists 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. It 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). It 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).

<u>Intended Functions</u>

1. Provides physical support, shelter and protection for safety-related systems, structures, and components (SSCs). The reactor enclosure crane is safety-related, seismically qualified, and is used to transport heavy loads over the 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 other in scope cranes and hoists handle safety-related or nonsafety-related loads above or near safety-related components. 10 CFR 54.4(a)(2)

UFSAR References

9.1.4
9.1.5

License Renewal Boundary Drawings

None.

Table 2.3.3-6 Cranes and Hoists
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Structural Support
Crane/Hoist (Bridge / Trolley / Girders)	Structural Support
Crane/Hoist (Jib crane / Columns / Beams / Plates / Anchorage)	Structural Support
Crane/Hoist (Monorail Beams / Lifting Devices / Plates)	Structural Support
Crane/Hoist (Rail System)	Structural Support

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

Table 3.3.2-6 Cranes and Hoists
Summary of Aging Management Evaluation

2.3.3.7 Emergency Diesel Generator Enclosure Ventilation System

Description

The Emergency Diesel Generator Enclosure Ventilation (EDGV) System is a standby safety-related mechanical system that provides ventilation and control of environmental conditions in the Emergency Diesel Generator Enclosure.

The EDGV System provides ventilation and cooling in the Emergency Diesel Generator Enclosure under normal plant operating conditions and following design basis events; provides heating under normal plant operating conditions; and provides suitable environmental conditions for personnel comfort and for the diesel generators and their accessories. Outdoor air is supplied to each Emergency Diesel Generator (EDG) cell through a concrete intake plenum. The EDGV System contains two exhaust fans per EDG cell which exhaust air from each of the cells vertically through a concrete exhaust structure. Cooling is accomplished by varying fan air flow. Each cell is equipped with a unit heater to provide heating. There are four EDG cells per unit.

The EDGV System also exhausts air from the EDG enclosure corridor and the condensate pump room. These functions do not support any intended functions, and are therefore not in the scope of license renewal. Additionally, the steam unit heaters installed in each EDG cell do not perform an intended function, and are also not in the scope of license renewal.

For more detailed information, see UFSAR Sections 3.5.1.1.1 and 9.4.6.

Boundary

The EDGV System license renewal scoping boundary begins at the outside air intake plenum of each diesel generator cell; includes the associated ductwork, dampers, thermostats, fans and instrumentation; and continues to the vertical exhaust structure of each cell.

The diesel engine combustion air intake duct up to the suction of the intake filter is part of the EDGV System. The intake filter and all other components of the diesel engine combustion air intake system and the diesel engine exhaust are part of the Emergency Diesel Generator license renewal system. The concrete intake plenums, intake bird screens, and concrete discharge structures are part of the Emergency Diesel Generator Enclosure license renewal system.

The heating coil portion of the EDG cell unit heaters is part of the Auxiliary Steam System. The EDG cell unit heaters, the EDG enclosure corridor ventilation equipment, and the condensate pump room ventilation equipment are not required to support intended functions and are not included within the scope of license renewal.

Reason for Scope Determination

The Emergency Diesel Generator Enclosure 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 Emergency Diesel Generator Enclosure 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 Emergency Diesel Generator Enclosure 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) and Station Blackout (10 CFR 50.63). The Emergency Diesel Generator Enclosure 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 Environmental Qualification (10 CFR 50.49) and Anticipated Transient Without Scram (10 CFR 50.62).

Intended Functions

1. Maintain emergency temperature limits within areas containing safety related components. The EDGV System maintains environmental conditions by providing ventilation and cooling to ensure that the operability of safety-related equipment located in the Emergency Diesel Generator Enclosure is maintained following design basis events. 10 FCR 54.4(a)(1)

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 EDGV System provides ventilation for equipment that is required to operate during a Fire Safe Shutdown event. 10 CFR 54.4(a)(3)

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 EDGV System provides ventilation for equipment that is required to operate during a Station Blackout scenario. 10 CFR 54.4(a)(3)

UFSAR References

3.5.1.1.1
9.4.6

License Renewal Boundary Drawings

LR-M-81, Sheet 1
LR-M-81, Sheet 3
LR-M-20, Sheet 8
LR-M-20, Sheet 14

Table 2.3.3-7 Emergency Diesel Generator Enclosure Ventilation System Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Ducting and Components	Pressure Boundary
Flexible Connection	Pressure Boundary

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

Table 3.3.2-7 Emergency Diesel Generator Enclosure Ventilation System Summary of Aging Management Evaluation

2.3.3.8 Emergency Diesel Generator System

Description

The Emergency Diesel Generator System is a standby mechanical system designed to provide sufficient electrical power to important plant equipment when normal offsite power sources are not available. The Emergency Diesel Generator System is in the scope of license renewal.

The purpose of the Emergency Diesel Generator System is to provide power to Class 1E and selected non-Class 1E loads that are needed to safely shutdown the reactor, maintain the plant in a safe shutdown condition, and mitigate the consequences of the design bases accident in the event that the preferred power sources are not available. The Emergency Diesel Generator System accomplishes this purpose by utilizing diesel engines to power electric generators. The system includes four standby diesel generators for each LGS unit (eight total), located in separate rooms of the Emergency Diesel Generator Enclosure. Each diesel generator is equipped with independent, self-contained auxiliary support systems that include starting air, jacket water coolant, air cooler coolant, engine lubricating oil, combustion air intake and exhaust, and diesel fuel oil storage and transfer. The Emergency Diesel Generator 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.

Each diesel engine powers a generator at a voltage compatible to the plant electrical distribution systems. The sizing of the diesel generators and their assigned loads is such that any combination of three out of four diesel generators is capable of supporting safe shutdown of the associated unit. Also included in the Emergency Diesel Generator System are directly attached piping, valves, pumps, tanks, heat exchangers, filters, instrumentation and other supporting equipment.

Each diesel engine automatically starts under loss of coolant accident conditions for the associated unit (low reactor water level or high drywell pressure signal coincident with low reactor pressure), or loss of power condition, (under-voltage condition in the 4160 Volt AC System). The diesels can also be manually started remotely from the main control room or at the local diesel generator control panels. The diesel generators are not automatically connected to their associated 4160 Volt AC bus until proper generator voltage and frequency are established, the breakers connecting the emergency busses to the offsite sources are tripped, and bus voltage is zero.

Each diesel generator has a starting air auxiliary system consisting of two independent starting air subsystems. Each starting air subsystem includes an air compressor, air receiver tank, air start distributor, filters, valves and piping. The air compressors maintain the air receiver tanks pressurized to support at least five engine starts per tank. Upon a diesel start signal the air start solenoid valves open to admit air from the air receiver tanks to the air start distributors to the engine cylinders, resulting in engine roll until it starts. The starting air system also provides a pressurized air supply to the engine speed governor to boost hydraulic pressure and improve engine starting time, to the aft main engine bearing to flood it with lube oil during engine start, and to the combustion air temperature controller which directs operation of the air cooler coolant loop temperature control valve. The safety function of the starting air auxiliary system is to provide for reliable starting of the diesel generators.

Each diesel generator includes a closed cooling water auxiliary system designed to provide sufficient cooling to the engine cylinder jackets, turbochargers and combustion air to support continuous engine operation under all load conditions. The cooling water system consists of two interconnected loops: the jacket water coolant loop and the air cooler coolant loop.

The jacket water coolant loop consists of an engine-driven jacket water pump, motor-driven circulating pump, electric heater, thermostatic control valve, heat exchanger, expansion tank, and associated piping and valves. The engine-driven jacket water pump circulates cooling water through the engine passages, through the turbochargers and engine jacket header, and to the three-way temperature control valve. This valve directs flow through or around the shell side of the jacket water heat exchanger and back to the pump suction. The jacket water coolant heat exchanger is cooled by the Safety Related Service Water System. The tube side heat exchanger components are evaluated with the Safety Related Service Water System. During standby conditions, the jacket water circulating pump circulates coolant flow through the heater to maintain jacket water and air cooler coolant temperature sufficiently warm to promote proper engine start from the standby condition. The expansion tank provides an adequate suction head for the jacket water and air cooler coolant pumps and accommodates thermal expansion of the coolant. Makeup to the expansion tank is from the Water Treatment and Distribution System.

The air cooler coolant loop consists of an engine-driven air cooler water pump, air coolers, thermostatic control valve, heat exchanger and associated piping and valves. The engine-driven air cooler water pump circulates cooling water through the air coolers and to the three-way temperature control valve. This valve directs flow through or around the shell side of the air cooler coolant heat exchanger and back to the pump suction. The air cooler coolant heat exchanger is cooled by the Safety Related Service Water System. The tube side heat exchanger components are evaluated with the Safety Related Service Water System.

Each diesel generator includes an independent oil lubrication system to provide a continuous flow of lube oil to diesel engine wear surfaces at a controlled pressure, temperature and cleanliness to support all engine functions. The lube oil system consists of an oil sump in the engine frame, engine-driven lube oil pump, thermostatic control valve, lube oil heat exchanger, motor-driven circulating pump, motor-driven pre-lube pump, electric emersion heater, makeup tank, filter, strainers, and associated piping and valves. The engine-driven lube oil pump takes suction from the sump and pumps oil through the filter to the three-way temperature control valve. This valve directs flow through or around the shell side of the lube oil heat exchanger. Oil then flows through strainers to the engine and drains back to the sump. During standby conditions, the circulating lube oil pump circulates oil through the heater and back to the sump to maintain lube oil sufficiently warm to support proper starting and loading. The pre-lube pump provides oil to lubricate the engine prior to manual (non-emergency) engine starts to reduce engine wear. The makeup tank stores fresh lube oil to replace oil that is consumed and lost during engine operation. The lube oil heat exchanger is cooled by the Safety Related Service Water System. The tube side heat exchanger components are evaluated with the Safety Related Service Water System.

Each diesel generator includes a combustion air intake and exhaust system to provide combustion air that is adequately filtered and at the proper temperature and pressure to support continuous engine operation at full load. The combustion air intake and exhaust system includes an air intake filter, air coolers, crankcase evacuation system ejector, an engine-driven scavenging air blower and two turbochargers, an exhaust silencer, and interconnecting piping and expansion joints. Air for combustion enters the system from outside the Emergency Diesel Generator Enclosure through an intake filter and passes through the compressor side of the exhaust gas-driven turbochargers. The duct from outside the Emergency Diesel Generator Enclosure to the air filter is evaluated for license renewal under the Emergency Diesel Generator Enclosure Ventilation System. The pressurized air is cooled by the air coolers prior to being delivered to the engine by the air blower. The blower provides scavenging air to the scavenging air receiver at low engine load, until the turbochargers build up speed. The scavenging air provides fresh air under pressure to support the combustion process and forces exhaust air out of the cylinders. A separate line from the scavenging air receiver provides air to the crankcase evacuation system ejector. After combustion, the exhaust gases pass through the exhaust manifolds, drive the turbochargers, and are discharged to atmosphere through the silencer and exhaust stack outside the Emergency Diesel Generator Enclosure. The exhaust silencer includes a condensation drain tank.

Each diesel generator includes an independent fuel oil storage, transfer and delivery system to provide a sufficient volume of clean, high quality fuel to support seven days of continuous operation following all design bases accidents. The fuel oil system includes a diesel oil storage tank, a diesel oil transfer pump, a day tank, an engine-driven fuel pump, a motor-driven fuel oil pump, dirty fuel drain tank, filters, strainers, and associated valves and piping. The diesel fuel pumps take suction from the day tank and pump fuel through filters to the injectors on the engine. The motor-driven pump is a backup to the engine-driven pump. Excess fuel oil is recycled from the engine back to the day tank. The diesel oil transfer pumps transfer oil from the storage tank through strainers to the day tank. The entire external surface and the internal bottom one foot of the underground diesel oil storage tank are coated for corrosion protection. Interconnections are provided to enable fuel oil transfer from any one oil storage tank to service the day tank of another engine.

Not included in the Emergency Diesel Generator System license renewal scoping boundary are the fuel oil system components that only support the Auxiliary Steam System (auxiliary boilers) and the Fire Protection System (diesel driven fire pump). Those fuel oil system components are evaluated separately within the Auxiliary Steam System and the Fire Protection System respectively.

Each Emergency Diesel Generator Enclosure includes a ventilation system that provides sufficient combustion air and ventilation through the diesel generator enclosure to maintain temperatures within suitable range to assure reliable operation of the diesel generator and associated equipment. This system is evaluated for license renewal under the Emergency Diesel Generator Enclosure Ventilation System.

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

<u>Boundary</u>

The Emergency Diesel Generator System license renewal scoping boundary encompasses the diesel engines, and components within the following auxiliary system flow paths: starting air, jacket water and air cooling coolant, engine lubricating oil, combustion air intake and exhaust, and diesel fuel oil storage and transfer.

The diesel engine starting air system for each diesel engine consists of two independent starting air subsystems. The boundary for each starting air subsystem begins at the air compressor and continues through the air-receiver tank, the air start solenoid valve, and to the air start header and air start distributor on the diesel engine. The boundary continues from the air start distributor to the air admission check valves at each cylinder. Also included are branch lines at the diesel engine to the governor booster and to the aft main engine bearing. Also included is a branch line upstream of the air start valves to the combustion air temperature controller. Also included is a temporary hose connection on one air receiver tank on A, B and C diesels on Unit 1, and A and B diesels on Unit 2 to the Primary Containment Instrument Gas System to provide a long term emergency air supply in support of Fire Safe Shutdown requirements. Also included are strainers, filters, valves and instrumentation.

The diesel generator jacket water and air cooling coolant systems are interconnected. The jacket water coolant system boundary begins at the jacket water expansion tank and continues to the interconnection to the air cooler coolant loop, the engine-driven jacket water pump and to the diesel engine and turbochargers to provide cooling. Jacket water coolant exits the engine and continues to the temperature control valve and heat exchanger and back to the engine-driven pump. Also included is the keep warm line between the discharge from the engine and the suction of the engine-driven pump, including the motor-driven circulating pump and heater. The air cooler coolant boundary begins at the interconnection from the jacket water coolant loop to the engine-driven air cooler coolant pump and continues to the temperature control valve, heat exchanger, through the air coolers on the engine and back to the engine-driven pump. Also included is a line from the discharge of the air coolers back to the jacket water expansion tank that acts as a continuous vent for the loop. Also included are valves, instrumentation and fill and drain piping.

The diesel generator engine lubricating oil system boundary begins at the lube oil makeup tank and continues to the lubricating oil sump in the diesel engine which provides suction to the engine-driven oil pump. The lube oil recirculation loop begins at the engine-driven oil pump and continues to the filter and to the temperature control valve, heat exchanger, strainers and to the engine to provide lubrication. Also included is the keep warm flow loop to and from the sump that includes the lube oil circulating pump and heater, and the pre-lube flow loop that includes the pre-lube pump. Also included are strainers, valves, instrumentation and fill and drain piping.

The combustion air intake and exhaust system boundary has two flow paths. The air intake system boundary starts at the air intake filter inside the Emergency Diesel Generator Enclosure and continues to the turbocharger compressors, air coolers, blower and ends at the attachment point of the diesel engine to the scavenging air receiver. The exhaust system boundary begins at the attachment point of the diesel engine at the cylinder exhausts and continues through the exhaust header, turbocharger turbines, air silencer and ends at the exhaust stack outside the Emergency Diesel Generator Enclosure. The exhaust silencer includes a condensation drain pot. Also included is the crankcase evacuation system ejector and associated piping. Also included are valves, expansion joints, instrumentation and piping.

The diesel fuel oil storage and transfer system boundary begins with the diesel oil storage tanks and includes the diesel fuel oil transfer pumps and strainers, and continues through the fuel oil day tank, filter, the motor-driven and engine-driven fuel pumps, and ends at the connection point to the diesel engine. Also included are the fuel oil return lines to the day tank and the interconnections that allow fuel oil to be transferred from any storage tank to the day tank of any another engine. Also included are valves, instrumentation and fill and drain piping.

Also included in the license renewal scoping boundary of the Emergency Diesel Generator

System are those portions of nonsafety-related piping and equipment located in proximity to equipment performing a safety-related function. This includes the nonsafety-related portions of the system located in the Emergency Diesel Generator Enclosures and the Diesel Oil Storage Tank Structures (man-ways above the diesel fuel oil storage tanks). 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 scope of license renewal are the nonsafety-related portions of the Emergency Diesel Generator System located outside or underground.

Reason for Scope Determination

The Emergency Diesel Generator 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 Emergency Diesel Generator 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 Emergency Diesel Generator 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 Station Blackout (10 CFR 50.63). The Emergency Diesel Generator 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) and Anticipated Transient Without Scram (10 CFR 50.62).

Intended Functions

1. Provide motive power to safety-related components. The Emergency Diesel Generator 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 Emergency Diesel Generator System includes nonsafety-related water and oil filled lines in the Emergency Diesel Generator Enclosures and the Diesel Oil Tank Structures that have the potential for spatial interactions (spray or leakage) with safety-related SSCs. The air starting 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 Emergency Diesel Generator System provides an alternate power source required to be available within one hour from the initiation of 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 Emergency Diesel Generator 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 Emergency Diesel Generator System also provides an alternate

supply of compressed air to support operation of the main steam relief valves in the event that the Primary Containment Instrument Gas System is unavailable due to fire damage. 10 CFR 54.4(a)(3)

UFSAR References

8.3.1
9.5.4
9.5.5
9.5.6
9.5.7
9.5.8

License Renewal Boundary Drawings

Unit 1:
LR-M-20, Sheet 3
LR-M-20, Sheet 4
LR-M-20, Sheet 5
LR-M-20, Sheet 6
LR-M-20, Sheet 7
LR-M-20, Sheet 8

Unit 2:
LR-M-20, Sheet 9
LR-M-20, Sheet 10
LR-M-20, Sheet 11
LR-M-20, Sheet 12
LR-M-20, Sheet 13
LR-M-20, Sheet 14

Table 2.3.3-8 **Emergency Diesel Generator System**
Component Subject to Aging Management Review

Component Type	Intended Function
Blower (Combustion air)	Pressure Boundary
Bolting	Mechanical Closure
Compressor	Pressure Boundary
	Structural Support
Electric Heaters (Housing)	Pressure Boundary
Expansion Joints	Pressure Boundary
Flexible Connection	Pressure Boundary
Flow Device	Throttle
Heat Exchanger Components (Air Cooler Coolant - Shell Side Components)	Pressure Boundary
Heat Exchanger Components (Air Cooler Coolant - Tubes)	Heat Transfer
	Pressure Boundary
Heat Exchanger Components (Air Cooler Coolant - Tubesheet)	Pressure Boundary
Heat Exchanger Components (Air Cooler)	Heat Transfer
	Pressure Boundary
Heat Exchanger Components (Jacket Coolant - Shell Side Components)	Pressure Boundary
Heat Exchanger Components (Jacket Coolant - Tubes)	Heat Transfer
	Pressure Boundary
Heat Exchanger Components (Jacket Coolant - Tubesheet)	Pressure Boundary
Heat Exchanger Components (Lube Oil Cooler - Shell Side Components)	Pressure Boundary
Heat Exchanger Components (Lube Oil Cooler - Tubes)	Heat Transfer
	Pressure Boundary
Heat Exchanger Components (Lube Oil Cooler - Tubesheet)	Pressure Boundary
Hoses	Pressure Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
	Structural Support
Pump Casing (Coolant)	Pressure Boundary
Pump Casing (Fuel Oil)	Pressure Boundary
Pump Casing (Lube oil)	Pressure Boundary
Strainer (Element)	Filter
Tanks	Pressure Boundary
Tanks (Dirty Fuel Oil Drain Tank)	Leakage Boundary
Tanks (Exhaust Silencer Drain Pot)	Leakage Boundary

Component Type	Intended Function
Tanks (Fuel Oil Storage Tanks)	Pressure Boundary
Turbocharger Casing	Heat Transfer
	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

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

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

2.3.3.9 Fire Protection System

Description

The Fire Protection System is a mechanical system common to LGS 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.

The purpose of the Fire Protection System is to reduce the likelihood of fire occurrences, promptly detect and extinguish fires if they occur, and maintain the capability to safely shut down the plant in the event of a fire. The Fire Protection System accomplishes this by providing detection of smoke or excessive heat, alarms, annunciation, fire barriers, and fire suppression.

The Fire Protection System includes water, foam, carbon dioxide, and halon suppression systems. It also includes active and passive features such as fire doors, dampers, penetration seals, fire wraps, fire barrier walls and slabs, and oil retention dikes.

Two horizontal centrifugal fire pumps are provided, and are located in the Circulating Water Pump House. The lead pump is electric motor driven and the lag pump is diesel driven. The pumps supply fire suppression water to the yard fire main loop. Water for the fire pumps is taken from either Unit 1 or Unit 2 Cooling Tower Basins through connections to the circulating water lines. Both pumps are normally aligned to the Unit 1 Cooling Tower Basin. Fire protection water is distributed to the hydrants, hose stations, and water suppression systems of the plant from the yard fire main loop, which completely encircles the power block. Hose carts that can be moved to a nearby fire hydrant are also provided for supporting manual fire fighting activities. The connections to the yard fire main loop from the two fire pumps located in the Circulating Water Pump House are provided with valving such that either connection can be isolated while retaining 100 percent water supply capacity to the yard fire main loop.

Water main headers are provided to supply water to the different areas protected by sprinkler systems.

Wet pipe sprinkler system 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. System actuation transmits alarm signals to the control room.

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. In the 13.2 kV switchgear room, both fire detection and loss of air pressure in the supply line is required before the system actuates. 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 any system heat detection circuit. 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 ventilation systems of the plant. The water is supplied to the filters by means of a fixed piping system. Two valves are manually opened when a heat detector actuates a local alarm system and registers an alarm condition in the control room. A flow switch is provided for each charcoal filter deluge system to provide indication that flow is being provided to the filter. The operation is terminated manually by closing the valves.

Water curtain systems that provide a fixed pattern of water to block the path of a fire consist of an OS&Y gate valve, a deluge valve, at least one local pull station, piping, and open spray nozzles. The spray nozzles are arranged in a linear array across the top of the water curtain location. In addition, sprinklers discharging horizontally inward from the sides of the water curtain are provided where necessary to achieve the desired discharge density. Each water curtain system is actuated manually.

Wet standpipes for hose stations are located throughout the plant to allow for use of fire hose to support local fire brigade activity. The hose stations are arranged to provide an effective hose stream to all areas of the power block.

A third fire pump is provided as a backup to the two primary fire pumps. This pump is diesel engine driven and can be placed in service as a means to satisfy the requirement of providing an alternate pump. The backup water source for this pump is a 500,000 gallon backup fire water storage tank.

Foam extinguishing systems are provided for protection of fuel oil storage tank and for fire suppression inside the fuel oil pump house.

The low pressure carbon dioxide (CO2) system provides fire suppression to areas where an inert, electrically nonconductive suppression medium is required or is desirable. Total flooding CO2 systems provide fire suppression capability to both units' cable spreading rooms. CO2 hose reels are provided for the 13.2 kV switchgear area, both units' turbine exciter panels and the main control room. Local application CO2 systems are provided for both Units' Generator Exciter Bearings 11 and 12. Actuation of the CO2 suppression systems is manual. In addition to visual and audible alarms, the cable spreading room and Unit 2 turbine generator exciter housing bearings 11 and 12 CO2 discharge lines are equipped with odorizer cartridges which discharge a wintergreen scent with the CO2 to alert personnel in the area of the CO2 system initiation.

Halon is used to extinguish fire by inhibiting the chemical reaction of fuel and oxygen. Three independent halon extinguishing systems are provided for the raised flooring at elevation 289 feet in the Control Enclosure. Two of the systems serve the auxiliary equipment room. The third halon system serves the remote shutdown room. The halon systems are actuated by heat detectors; a predischarge alarm is sounded first, followed by a time-delayed discharge of halon.

Fire detection is accomplished by smoke, heat, or flame detectors. Detection of fire by any detector activates an audible coded fire signal throughout the plant and provides local alarms and annunciation in the control room. Detection systems that activate suppression systems transmit associated alarm signals to the control room to indicate system initiation.

For more detailed information, see UFSAR Section 9.5.1 and UFSAR Appendix 9A.

Boundary

The Fire Protection System license renewal boundary begins with the interface of fire pump suction water piping with the Circulating Water System and continues through the electric motor driven and diesel driven fire pumps located in the Circulating Water Pump House to the yard fire main and hydrants. Piping headers branch off the main to the various water suppression systems (sprinkler, charcoal filter spray, foam systems) located throughout the plant, including the Reactor Enclosures, Turbine Enclosures, Control Enclosure, Emergency Diesel Generator Enclosures, Auxiliary Boiler and Lube Oil Storage Enclosure, Radwaste Enclosure, Fuel Oil Pump House, Office and Administrative Facilities, and the Main, Auxiliary, and Safeguard Transformer areas.

Included is the interface with the Nonsafety-Related Service Water System piping for pressurization of the fire main.

The boundary for the carbon dioxide suppression system begins with the CO2 storage unit and continues through the distribution piping, valves, and nozzles in the Control Enclosure and Turbine Enclosures.

The boundary for the halon suppression system begins with the storage tanks and continues through piping and valves to the dispersal nozzles in the Control Enclosure.

Portable fire fighting equipment is included in this scoping evaluation, but a boundary description is not applicable to this self-contained equipment.

The boundary for the diesel fuel oil supply for the diesel engine for the diesel-driven fire pump begins with the fire pump engine diesel oil day tank and includes the supply and return piping up to the connection points on the fuel pump attached to and considered an intrinsic part of the diesel engine driver.

Also included is the backup fire water system. This system includes a backup fire water storage tank and diesel-driven backup fire pump with its associated diesel fuel oil supply tank, all located outside the protected area. This backup system is maintained as an alternate to satisfy requirements for providing a backup suppression water source in the event of unavailability of the primary pumps or water sources. The boundary begins with the backup fire water storage tank and continues through buried piping to the backup fire pump and jockey pump, and continues to the connection with the yard fire main. Also included are the backup fire pump diesel fuel tank and supply and return fuel lines up to the attachment point on the backup diesel engine fuel pump.

All associated piping, components, and instrumentation contained within the flowpath described above are included in the system evaluation boundary. 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 oil retention dikes.

Fire detection and signaling systems and associated circuitry are evaluated as an electrical commodity.

Also included in the license renewal scoping boundary of the Fire Protection System are those water or oil filled portions of nonsafety-related piping and equipment located in proximity to equipment performing a safety-related function. This includes the nonsafety-related portions of the system located within the Reactor Enclosures, Turbine Enclosures, Control Enclosure, and Emergency Diesel Generator Enclosures. 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.

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 has leakage boundary intended functions and the potential for spatial interaction with safety-related equipment located in the vicinity of water-filled fire protection system piping. 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
App 9A

License Renewal Boundary Drawings

LR-M-09, Sheet 3
LR-M-09, Sheet 8
LR-M-10, Sheet 1
LR-M-10, Sheet 6
LR-M-20, Sheet 2
LR-M-22, Sheet 1
LR-M-22, Sheet 2
LR-M-22, Sheet 3
LR-M-22, Sheet 4

LR-M-22, Sheet 5
LR-M-22, Sheet 6
LR-M-22, Sheet 7
LR-M-22, Sheet 9
LR-M-75, Sheet 3
LR-M-75, Sheet 7
LR-M-76, Sheet 3
LR-M-76, Sheet 5
LR-M-76, Sheet 6
LR-M-76, Sheet 9
LR-M-76, Sheet 10
LR-M-78, Sheet 1
LR-M-78, Sheet 4
LR-M-79, Sheet 2

Table 2.3.3-9 Fire Protection System
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Concrete Curbs	Fire Barrier
Dikes	Direct Flow
Fire Barriers (Doors)	Fire Barrier
Fire Barriers (Fire Rated Enclosures)	Fire Barrier
Fire Barriers (For steel components)	Fire Barrier
Fire Barriers (Penetration Seals)	Fire Barrier
Fire Barriers (Walls and Slabs)	Fire Barrier
Fire Hydrant	Pressure Boundary
Flexible Connection	Pressure Boundary
Flow Device	Pressure Boundary
Hoses	Pressure Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing (Diesel Driven Fire Pump, Motor Driven Fire Pump, Diesel Driven Backup Pump, Electric Backup Jockey Pump, Backup Jockey Pump, Well Pump)	Pressure Boundary
Spray Nozzles	Spray
Sprinkler Heads	Pressure Boundary
	Spray
Strainer (Element)	Filter
Tanks (00-T519 Foam Solution Tank)	Pressure Boundary
Tanks (00-T530 Diesel Oil Day Tank)	Pressure Boundary
Tanks (10-T402 Backup Fire Water Storage Tank)	Pressure Boundary
Tanks (10-T404 Backup Fuel Oil Tank)	Pressure Boundary
Tanks (CO2)	Pressure Boundary
Tanks (Halon Cylinders)	Pressure Boundary
Tanks (Retard Chambers)	Pressure Boundary
Valve Body	Pressure Boundary
Water Motor Alarm	Pressure Boundary

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

Table 3.3.2-9 Fire Protection System
Summary of Aging Management Evaluation

2.3.3.10 Fuel Handling and Storage

Description

The Fuel Handling and Storage System consists of the spent fuel storage racks and special storage racks within the spent fuel storage pools and fuel handling equipment. The purpose of the Fuel Handling and Storage System is to provide safe and effective storage, transport, and handling of nuclear fuel from the time it enters the plant prior to being irradiated until it leaves the plant.

The spent fuel storage pools and cask loading pit are located in the refueling area within the reactor enclosure. Each LGS unit has a spent fuel pool. The cask loading pit is 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 loading pit and reactor wells are reinforced concrete structures that are an integral part of the reactor enclosure. They are lined with stainless steel plate to minimize leakage. The spent fuel pools contain high-density storage racks for new and spent fuel. The fuel racks are equipped with Boral thermal neutron poison material. The spent fuel pools also contain stainless steel special 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 Fuel Pool Cooling and Cleanup System maintains water temperature and chemistry parameters within acceptable limits. That system is evaluated with the license renewal Fuel Pool Cooling and Cleanup System. The spent fuel storage pools, cask loading pit, spent fuel storage racks and special storage racks are safety-related and designed to seismic I criteria.

Fuel handling equipment consists of the reactor enclosure overhead crane, refueling platforms, fuel floor auxiliary platforms, service platform, fuel preparation machines, new fuel upending platform and inspection stand, and jib cranes, hoists and special purpose tools for fuel handling and reactor servicing. The reactor enclosure overhead crane is separately evaluated with the license renewal Cranes and Hoists System and is not discussed herein.

The refueling platforms are motor driven gantry cranes that include a bridge structure and trolley that span the spent fuel pools and the reactor wells. A refueling platform is provided for each LGS unit. The platforms extend the width of the bridge structure, providing working access to the entire width of the spent fuel pools and the reactor wells. The bridge travels on rails embedded in the refueling floor extending on both sides of the spent fuel pool and the reactor well. The trolley runs on rails on top of the bridge. The fuel handling grapple is supported by the main hoist and telescoping mast, mounted on the trolley. The refueling platform structure supports a main hoist, frame mounted auxiliary hoist, monorail auxiliary hoist and service pole caddy platform and hoist that are used with various refueling and component handling tools to handle core components and support maintenance on the reactor vessel and internals. The refueling platforms are safety-related and designed to seismic I criteria.

Two fuel preparation machines are mounted on the walls of each spent fuel storage pool. Each fuel preparation machine consists of a work platform, a frame, and a movable carriage.

The fuel preparation machines provide physical support of fuel bundles during inspections, channel installation and removal. The frame and movable carriage are located below the normal water level in the spent fuel storage pool to provide radiation shielding from the fuel assemblies being handled. The fuel preparation machines are safety-related and designed to seismic I criteria.

The new fuel upending platform and attached hoists move new fuel into the fuel inspection stand. The new fuel inspection stand supports new fuel bundles during inspection and provides a working platform for technicians during inspection. The new fuel upending platform and inspection stand are nonsafety-related and are not designed for the SSE.

In addition to the hoists on the refueling platform, the following jib cranes and hoists are included with the Fuel Handling and Storage System:

- Reactor Cavity Work Platform Hoists
- Service Platform Pole Caddy Hoist
- Fuel Floor Auxiliary Platform Hoists
- New Fuel Handling Gantry Cranes
- New Fuel Upending Hoists
- New Fuel Channel Handling Hoists

Special purpose tools include the Reactor Cavity Work Platform (RCWP), Fuel Floor Auxiliary Platform (FFAP), service platform, in-vessel storage racks, fuel grapple, general purpose grapple, control rod blade grapple, combined control rod blade and fuel support piece grapple, channel handling tool, channel bolt wrench, fuel bundle sampler, channel gauging fixture, lifting devices, under vessel service equipment, and other tools specifically designed for handling nuclear fuel and for servicing the reactor and reactor vessel internals.

The RCWP is a removable structure that, when installed, spans the reactor well, providing additional access for in-vessel inspection and repairs. The RWCP is not used for handling of fuel or heavy loads. The RCWP is partially submerged in the reactor well to allow the refueling platform to operate while the RCWP is in place. The RCWP is nonsafety-related but designed to seismic IIA criteria to assure it cannot damage fuel or safety-related components in the vessel during a seismic event.

The FFAP is a mobile structure that spans the fuel storage pool and reactor well to provide access and hoisting capability to support work in the reactor wells, spent fuel pools, and cask loading pits. The FFAP is not used for handling of fuel, irradiated core components or heavy loads. The FFAP is nonsafety-related but designed to seismic IIA criteria to assure it cannot damage fuel or safety-related components in the vessel during a seismic event.

The service platform is a removable structure that, when installed, rests on the reactor vessel flange, providing access for in-vessel inspection and repairs. The service platform is not used for handling of fuel or heavy loads. The physical size of the service platform is such that it cannot enter the reactor vessel or impact safety-related components. It is nonsafety-related and is not designed for the SSE.

The fuel grapple is used with the refueling platform hoist and mast to engage fuel assemblies for transport and handling. The general purpose grapple is used to place new fuel in the inspection stand, handle new fuel during channeling and transport it to the fuel storage rack.

The control rod blade grapple and combined control rod blade and fuel support piece grapple are used with hoists on the refueling platform to handle control rod blades and fuel support pieces. The fuel grapple, general purpose grapple, control rod blade grapple and combined control rod blade and fuel support piece grapple are safety-related and designed to seismic I criteria. The in-vessel storage rack is used to temporarily store core components prior to installation or following removal from the vessel during refueling. The in-vessel storage rack is safety-related and designed to seismic I criteria.

The channel handling tool, channel bolt wrench, fuel bundle sampler, channel gauging fixture, under vessel service equipment, and other tools specifically designed for servicing reactor vessel internals during an outage are nonsafety-related and are not designed for the SSE.

For more detailed information, refer to UFSAR Sections 9.1.1, 9.1.2 and 9.1.4.

Boundary

Included within the evaluation boundary of the Fuel Handling and Storage System are the spent fuel storage racks, new fuel storage racks, special storage racks, refueling platforms, fuel preparation machines, new fuel upending platform and inspection stand, jib cranes, hoists and the special purpose tools used for fuel handling and servicing of the reactor vessel and reactor internals.

The spent fuel storage racks are in scope for license renewal since they perform safety-related functions to provide safe storage of new and spent fuel in a subcritical configuration. The special storage racks are in scope since they provide safe and subcritical storage of spent fuel, and safe storage of reactor components such that their storage cannot adversely affect spent fuel. The refueling platforms and their main hoists provide for the safe handling of nuclear fuel and are therefore in scope. The refueling platform frame mounted hoists, monorail auxiliary hoists and service pole caddy hoists provide a safe means for handling loads above fuel and safety-related equipment and are therefore in scope. The hoists on the reactor cavity work platform, service platform and fuel floor auxiliary platform also handle loads above irradiated fuel and safety-related components and are therefore in scope.

The new fuel upending platform and inspection stand are nonsafety-related, are not designed for the SSE and are therefore not in scope. New fuel handling is performed in an area on the refueling floor where failure of the new fuel handling gantry crane, upending hoists and channel handling hoists cannot damage irradiated fuel or safety-related equipment, therefore they are not in scope. Use of the new fuel storage vaults and new fuel storage racks installed within them is not permitted by procedures as discussed in the UFSAR. Therefore, the new fuel storage racks are not in scope for license renewal.

The fuel preparation machines are in scope for license renewal because they provide support for new and spent fuel assemblies during handling and provide adequate radiation shielding from irradiated fuel. Special purpose tools that are classified as safety-related or are designed to seismic IIA criteria to assure they cannot damage fuel or safety-related components in the vessel during a seismic event are in scope. Tools that are in scope include the RCWP, FFAP, fuel grapple, general purpose grapple, control rod blade grapple, combined control rod blade and fuel support piece grapple and in-vessel storage racks.

Not included in the boundary of the Fuel Handling and Storage System are the new fuel vaults, spent fuel storage pools and liner plate, cask storage pits and liner plate, reactor cavity liners, steam dryer and moisture separator storage pool liners and fuel pool gates that are separately evaluated with the license renewal Reactor Enclosure Structure. The reactor enclosure overhead bridge crane is separately evaluated with the license renewal Cranes and Hoists System.

Reason for Scope Determination

The Fuel Handling 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 Handling and Storage 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 Handling and Storage 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. 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 a k(eff) less than or equal to 0.95. 10 CFR 54.4(a)(1)

2. 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)

3. Provides radiation shielding protection for personnel and equipment and components. The refueling platform, associated hoists, fuel prep machines, spent fuel storage racks and special storage racks are designed to provide adequate radiation shielding for plant personnel from spent fuel and irradiated reactor components. 10 CFR 54.4 (a)(1)

4. Provides a safe means for handling safety-related components and loads above or near safety-related components. The refueling platform and associated hoists provide a safe means for handling new and spent fuel, tools and reactor components within the spent fuel pools and reactor wells above fuel and reactor components. 10 CFR 54.4(a)(2)

5. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The Reactor Cavity Work Platform, Fuel Floor Auxiliary Platform and associated hoists are nonsafety-related components that are required to maintain structural integrity during a design basis seismic event to preclude damage to nuclear fuel or safety-related vessel internals. 10 CFR 54.4 (a)(2)

UFSAR References

9.1.1
9.1.2
9.1.4
Table 3.2-1

License Renewal Boundary Drawings

None

Table 2.3.3-10 Fuel Handling and Storage
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Structural Support
CRB and Defective Fuel Racks (In Spent fuel Pool)	Structural Support
Crane/Hoist (FFAP and Hoists)	Structural Support
Crane/Hoist (Fuel Prep Machine)	Structural Support
Crane/Hoist (RCWP)	Structural Support
Crane/Hoist (Rail System)	Structural Support
Crane/Hoist (Refueling Mast/Grapples)	Structural Support
Crane/Hoist (Refueling Platform and Hoists)	Structural Support
Equipment Storage Racks (In Spent Fuel Pool)	Structural Support
Fuel Storage Racks	Absorb Neutrons
	Structural Support
In-Vessel Storage Racks	Structural Support
Special Defective Fuel Storage Container	Structural Support

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

Table 3.3.2-10 Fuel Handling and Storage
Summary of Aging Management Evaluation

2.3.3.11 Fuel Pool Cooling and Cleanup System

Description

The Fuel Pool Cooling and Cleanup System is a normally operating system designed to remove decay heat from the spent fuel pool and maintain specified fuel pool water temperature, level, purity and clarity. The Fuel Pool Cooling and Cleanup System consists of equipment including weirs, skimmer surge tanks, heat exchangers, pumps, a water purifying loop, discharge diffusers within the fuel pool, and associated valves, piping components and instrumentation. The Fuel Pool Cooling and Cleanup 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 Cleanup System is to remove decay heat from spent fuel assemblies stored in the spent fuel pool, maintain fuel pool water temperature within required limits, purify water in the spent fuel pool and minimize contamination and radiation exposure from fission and corrosion product buildup in the spent fuel pool water.

The Fuel Pool Cooling and Cleanup System circulates water from the surface of the spent fuel pool where water flows through weirs and a wave suppression scupper by gravity to the skimmer surge tanks and through the fuel pool heat exchangers to the fuel pool cooling pumps. From the pump discharge, flow can be directed back to the spent fuel pool or through a purifying loop prior to being returned to the pool. Heat is removed from the heat exchangers by the Nonsafety-Related Service Water System. The purifying loop consists of a filter demineralizer that maintains pool water clarity by filtration and ion exchange. A common purifying loop can be aligned to Unit 1 or Unit 2. Included within the Fuel Pool Cooling and Cleanup System are the piping, valves, equipment and instrumentation associated with the filter demineralizers.

During refueling operations the Fuel Pool Cooling and Cleanup System can be aligned to also circulate, cool and process water from the reactor well, dryer and separator storage pool and cask loading pit. As the heat load in the spent fuel pool changes, service water cooling flow rate and the number of operating heat exchangers and pumps are adjusted to control pool water temperature. If an abnormally high heat load is placed on the Fuel Pool Cooling and Cleanup System during refueling operations, a cooling train of the Residual Heat Removal (RHR) System can be substituted for the normal Fuel Pool Cooling and Cleanup System pumps and heat exchangers. A connection downstream of the skimmer surge tanks to the safety-related RHR System allows one RHR pump to circulate fuel pool water through an RHR heat exchanger and return it to the spent fuel pool or to the reactor well through the shutdown cooling return to the plant Reactor Recirculation system. Administrative controls prevent use of the RHR system for spent fuel pool cooling unless the reactor is shutdown and in the refueling mode. If there is a complete loss of capability to remove heat from the spent fuel pool using heat exchangers, heat can be removed by allowing the spent fuel pool to boil and adding makeup water to maintain pool water level. Makeup water is normally provided by the nonsafety-related Water Treatment and Distribution System. If this source is not available, makeup can be provided from the ultimate heat sink (spray pond) via the Safety Related Service Water System.

The Fuel Pool Cooling and Cleanup System piping and equipment from the skimmer surge tanks to their common outlet valve including the branch connection to the RHR System is safety-related and designed to seismic Category 1 criteria. Downstream piping and equipment through the fuel pool heat exchangers and pumps and back to the fuel pool is nonsafety-related and designated as seismic category IIA, but designed to seismic Category 1 criteria. Also, the piping flow path from the RHR heat exchanger back to the fuel pool and the makeup supply from the Safety Related Service Water System are safety-related and designed to seismic Category 1 criteria. All other portions of the Fuel Pool Cooling and Cleanup System are nonsafety-related.

The Fuel Pool Cooling and Cleanup System also includes associated piping installed to detect water leakage through the liners installed in the spent fuel pools, reactor wells, dryer and separator storage pools, and cask loading pits. Also included with the Fuel Pool Cooling and Cleanup System is nonsafety-related piping from the Water Distribution System and Condensate System to the high pressure decontamination pump, discharge distribution header and associated equipment located on the refueling floor.

For more detailed information, see UFSAR Sections 7.7.1.14, 7.7.2.14 and 9.1.3.

<u>Boundary</u>

The Fuel Pool Cooling and Cleanup System license renewal scoping boundary begins at the wave suppression scupper and weirs at the spent fuel pool water surface and continues within the reactor enclosure to the piping to the skimmer surge tanks and through the fuel pool heat exchangers to the fuel pool cooling water pumps. From the pump discharge, the piping leaves the reactor enclosure, enters the radwaste enclosure and continues to the filter demineralizer. From the filter demineralizer, the piping returns to the reactor enclosure and continues to the spent fuel pool. The safety-related piping and equipment starting at the skimmer surge tanks to the common skimmer surge tanks discharge valve, and the branch connection to the RHR System is within the scope of license renewal. The safety-related return piping from the RHR System to the spent fuel pool and associated equipment is also within the scope of license renewal. Also within the license renewal scoping boundary are the safety-related piping and equipment associated with providing makeup water inventory to the spent fuel pool from the Safety Related Service Water System.

Included in the license renewal scoping boundary are those water filled portions of nonsafety-related piping and equipment located in proximity to equipment performing a safety-related function. This includes the nonsafety-related portions of the system located on the refueling floor and within the reactor enclosures. Included in this boundary are pressure-retaining components from the weirs to the skimmer surge tanks and from the common skimmer surge tank discharge valve through the fuel pool cooling heat exchangers and pumps to the reactor enclosure penetration. Also included is the piping installed to detect water leakage through the liners installed in the spent fuel pools, reactor wells, dryer and separator storage pools, and cask loading pits. Also included are the piping and equipment associated with the high pressure decontamination pump and piping from the Water Distribution System to the skimmer surge tanks. This piping and equipment is relied upon to preserve the leakage boundary intended function of this portion of the system. Piping and equipment within the Radwaste Enclosure does not have an intended function and is not in scope for license renewal. The piping penetrations at the reactor enclosure wall serve as the seismic anchors for this piping. For more information, refer to the License Renewal Boundary Drawings for identification of this boundary, shown in red.

Not included within the Fuel Pool Cooling and Cleanup System are the spent fuel storage racks that are evaluated within the license renewal Fuel Handling and Storage System. The spent fuel pool, reactor well, dryer and separator storage pool and cask loading pit liners, reactor well seals and inflatable fuel storage pool gate seals are evaluated within the license renewal Reactor Enclosure Structure. The cooling water supply and return and the tube side of the fuel pool cooling heat exchangers are evaluated within the license renewal Nonsafety-Related Service Water System. The refueling bellows assemblies are evaluated within the license renewal Primary Containment Structure.

Reason for Scope Determination

The Fuel Pool Cooling and 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 Fuel Pool Cooling and 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 Fuel Pool Cooling and 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. Ensure adequate cooling in the spent fuel pool to maintain stored fuel within acceptable temperature limits. The Fuel Pool Cooling and Cleanup 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. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The Fuel Pool Cooling and Cleanup System includes nonsafety-related piping and equipment that has the potential to spatially and structurally interact with safety-related components located in the reactor enclosures and on the refueling floor. 10 CFR 54.4(a)(2)

UFSAR References

3.2
6.1
7.7.1
7.7.2
9.1.3

License Renewal Boundary Drawings

LR-M-53 Sheet 1
LR-M-53 Sheet 2
LR-M-53 Sheet 3
LR-M-53 Sheet 4
LR-M-23 Sheet 4
LR-M-23 Sheet 7
LR-M-47 Sheet 1
LR-M-47 Sheet 2

LR-M-51 Sheet 1
LR-M-51 Sheet 3
LR-M-51 Sheet 5
LR-M-62 Sheet 1

Table 2.3.3-11 Fuel Pool Cooling and Cleanup System
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Expansion Joints	Pressure Boundary
Flow Device	Leakage Boundary
Heat Exchanger Components (Fuel Pool Cooling Heat Exchanger - Shell Side Components)	Leakage Boundary
Hoses	Leakage Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing (Fuel Pool Cooling Pumps)	Leakage Boundary
Pump Casing (HP Decon PP)	Leakage Boundary
Strainer (Grates and Screens)	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 3.3.2-11 Fuel Pool Cooling and Cleanup System
Summary of Aging Management Evaluation

2.3.3.12 Nonsafety-Related Service Water System

Description

The Nonsafety-Related Service Water (NSSW) System is a normally operating system designed to supply the cooling water required for normal plant operation. The system has no safety-related functions.

The purpose of the NSSW System is to remove heat from heat exchangers in the turbine, reactor, control and radwaste enclosures and to transfer this heat to the cooling towers where it is dissipated. The NSSW System accomplishes this purpose by forced circulation of cooling water through heat exchangers. The service water flow to the heat exchangers is regulated by hand valves, temperature control valves, or solenoid operated valves. The system is designed to operate during normal plant operation and plant shutdown with offsite power available.

The NSSW System is a single-loop cooling system utilizing pumps located in the circulating water pump structure that circulate cooling water from the cooling tower, through the heat exchangers and back to the cooling tower. Each of the two generating units is provided with a separate NSSW System and cooling tower, although interconnections are provided so that either NSSW System can cool equipment common to both units. During normal operation, the NSSW System supplies cooling water to various heat exchangers and coolers associated with the Safety Related Service Water System. In the event of a loss of off-site power (LOOP) or loss of cooling accident (LOCA), cooling for these components is automatically supplied by the Safety-Related Service Water System. During a refueling outage, the NSSW System supports decay heat removal during certain periods. In the event of a loss of all NSSW pumps on the refuel unit, the operating unit can supply a limited quantity of service water through the common service water header to support decay heat removal.

The NSSW System is a moderate energy system and does not include any safety-related or environmentally qualified components.

Portions of the Nonsafety-Related Service Water System are located in the vicinity of safety-related main steam piping and components in the Turbine Enclosures and safety-related SSC in the Reactor Enclosures and Control Enclosure. The intended function of these portions of the Nonsafety-Related Service Water 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 Section 9.2.1.

Boundary

The license renewal scoping boundary of the NSSW System encompasses the liquid-filled portion of the system that is located in proximity to equipment performing a safety-related function. This includes the liquid-filled portions of the system located within the Reactor Enclosure, Control Enclosure, and Turbine Enclosure. 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 Drawings for identification of this boundary, shown in red.

Not included in the scope of license renewal is the portion of the NSSW System located outside of the main condenser compartment in the Turbine Enclosure and the portions of the NSSW System that are located within the Radwaste Enclosure.

Reason for Scope Determination

The Nonsafety-Related Service 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 Nonsafety-Related Service 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 Nonsafety-Related Service Water 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 NSSW System contains nonsafety-related moderate energy lines in the Reactor Enclosure, Control Enclosure, and Turbine Enclosure which have potential spatial and structural interactions with safety-related SSCs. 10 CFR 54.4(a)(2)

UFSAR References

3.2
3.6
9.1.3
9.2.1

License Renewal Boundary Drawings

LR-M-10, Sheet 1
LR-M-10, Sheet 2
LR-M-10, Sheet 3
LR-M-10, Sheet 5
LR-M-10, Sheet 6
LR-M-10, Sheet 7
LR-M-10, Sheet 8
LR-M-10, Sheet 10
LR-M-11, Sheet 2
LR-M-11, Sheet 3
LR-M-11, Sheet 4
LR-M-11, Sheet 5
LR-M-69, Sheet 1
LR-M-69, Sheet 3

Table 2.3.3-12 <u>Nonsafety-Related Service Water System</u>
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Flow Device	Leakage Boundary
Heat Exchanger Components (Condenser Compartment Unit Cooler tube side components)	Leakage Boundary
Heat Exchanger Components (Recombiner Aftercondenser, Fuel Pool Heat Exchanger, and Reactor Enclosure Cooling Water Heat Exchanger tube side components)	Leakage Boundary
Piping, piping components, and piping elements	Leakage Boundary
Pump Casing	Leakage Boundary
Valve Body	Leakage Boundary

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

Table 3.3.2-12 Nonsafety-Related Service Water System
Summary of Aging Management Evaluation

2.3.3.13 Plant Drainage System

Description

The Plant Drainage System is a normally operating mechanical system designed to collect various liquid wastes generated in the operation of the plant.

The Plant Drainage System consists of the following plant systems: equipment and floor drainage radwaste system, the normal waste system, the oily waste system, the acid waste system, the storm drainage system, and the sanitary waste 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 Radwaste System

The purpose of the equipment and floor drainage radwaste system is to collect potentially radioactive 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 to sumps or tanks for eventual processing through the plant Radwaste system. The equipment and floor drainage radwaste system is divided into liquid radwaste collection, chemical waste collection, and laundry waste collection subsystems so that the liquid wastes from various sources can be kept segregated and processed separately by the appropriate methods.

The reactor enclosure floor drainage radwaste system includes safety-related check valves in the Emergency Core Cooling System (ECCS) compartment drain lines to prevent backflow from the reactor enclosure floor drain sumps into the ECCS compartments in the event that significant quantities of water are conveyed to the sumps.

The reactor enclosure equipment and floor drainage radwaste system drain networks are credited to mitigate the consequences of HELB and MELB events by providing flow paths for steam and water for pressurization and flooding considerations.

The Reactor Enclosure and Control Enclosure include floor drainage radwaste system drains credited for Fire Protection that prevent water accumulation and damage to safety-related equipment.

The reactor enclosure floor drainage radwaste system provides secondary containment boundary. Plugs are installed in the radwaste drains in the reactor enclosure and refueling area HVAC (supply) area to maintain secondary containment integrity.

Non-embedded portions of the equipment and floor drainage radwaste system in proximity to safety-related equipment in the Primary Containment, Reactor Enclosure, Control Enclosure, and Turbine Enclosure are in scope for spatial interaction.

Normal Waste System

The purpose of the normal waste system is to collect and process nonradioactive liquid wastes generated in the operation of the plant. The system accomplishes this by collecting liquid wastes from nonradioactive floor and equipment drains and conveying these wastes to the holding pond for processing and subsequent release into the Schuylkill River.

The RHRSW and ESW valve pits include normal waste drains credited for the removal of seepage water following the probable maximum precipitation.

The Control Enclosure includes normal waste floor drains credited for Fire Protection that prevent water accumulation and damage to safety-related equipment.

The curbed areas associated with the oil-filled main transformers, the safeguard transformers, and the auxiliary transformers have normal waste catch basins credited for Fire Protection to remove drainage away from plant buildings.

Non-embedded portions of the normal waste system in proximity to safety-related equipment in the Control Enclosure, Emergency Diesel Generator Enclosure, Spray Pond and Pump House, and Turbine Enclosure are in scope for spatial interaction.

Oily Waste System

The purpose of the oily waste system is to collect and process nonradioactive oily liquid wastes generated in the operation of the plant. The system accomplishes this by collecting liquid wastes from the nonradioactive equipment areas in which oil is expected to be present and processing these wastes through oil interceptors.

The Emergency Diesel Generator Enclosure includes oily waste floor drains credited for Fire Protection to prevent water accumulation and damage to safety-related equipment.

Non-embedded portions of the oily waste system in proximity to safety-related equipment in the Emergency Diesel Generator Enclosure and Turbine Enclosure are in scope for spatial interaction.

Acid Waste System

The purpose of the acid waste system is to collect acid wastes generated in the operation of the plant. The system accomplishes this by collecting liquid wastes possibly containing nonradioactive chemicals and corrosive substances.

Non-embedded portions of the acid waste system in proximity to safety-related equipment in the Control Enclosure and Turbine Enclosure are in scope for spatial interaction.

Storm Drainage System

The purpose of the storm drainage system is to collect water resulting from precipitation. The system accomplishes this by collecting water resulting from precipitation on enclosure roofs and areaways, paved and unpaved surfaces, and irrigation runoffs areas outside of the enclosures and conveying it to Possum Hollow Run and the Schuylkill River.

Non-embedded portions of the storm drainage system in proximity to safety-related equipment in the Reactor Enclosure, Control Enclosure, Emergency Diesel Generator Enclosure, Spray Pond and Pump House, and Turbine Enclosure are in scope for spatial interaction.

Sanitary Waste System

The purpose of the sanitary waste system is to collect sanitary waste. The system accomplishes this by collecting liquid wastes and entrained solids discharged by all plumbing fixtures located in areas with no sources of potentially radioactive wastes and conveying them to a public sanitary sewage collection and treatment system. The on-site sewage treatment and retention system is not used, but serves as a backup collection and holding system in the event the public sewer system cannot be used.

Non-embedded portions of the sanitary waste system in proximity to safety-related equipment in the Control Enclosure are in scope for spatial interaction.

For more detailed information see UFSAR Sections 3.4.1.1, 3.6.1, 9.3.3, and 9.5.1.

Boundary

The Plant Drainage System license renewal scoping boundary includes those portions of the reactor enclosure floor drainage radwaste system required to prevent backflow from the reactor enclosure floor drain sumps into the ECCS compartments. The boundary includes the safety-related check valves and the portion of the ECCS compartment drain lines between the sump pit wall and the check valves.

The reactor enclosure equipment and floor drainage radwaste system drain network is also in scope to mitigate the consequences of HELB and MELB events by providing flow paths for steam and water for pressurization and flooding considerations. The boundary begins at the individual floor or equipment drain and continues through the drain header and terminates at the reactor enclosure floor and equipment drain sumps (evaluated with the Reactor Enclosure Structure).

The Reactor Enclosure and Control Enclosure include floor drainage radwaste system drains credited for Fire Protection that prevent water accumulation and damage to safety-related equipment. The boundary begins at the credited floor drain and continues through the drain header and terminates at the reactor enclosure or control enclosure floor drain sumps (evaluated with the respective structure).

The Reactor Enclosure includes plugged floor drainage radwaste system drains credited to maintain secondary containment. This boundary includes the plugs installed in the radwaste floor drains located in the reactor enclosure and refueling area HVAC (supply) area.

The RHRSW and ESW valve pits include normal waste drains credited for the removal of seepage water following the probable maximum precipitation. The boundary begins at the credited drain pipe and continues through the drain header and terminates at the normal waste yard header.

The Control Enclosure includes normal waste floor drains credited for Fire Protection that prevent water accumulation and damage to safety-related equipment. The boundary begins at the credited floor drain and continues through the drain header and terminates at the normal waste yard header.

The curbed areas associated with the oil-filled main transformers, the safeguard transformers, and the auxiliary transformers have normal waste catch basins credited for Fire Protection to remove drainage away from plant buildings. The boundary begins at the credited catch basins and continues through the drain header and terminates at the normal waste yard header.

The Emergency Diesel Generator Enclosure includes oily waste floor drains credited for Fire Protection to prevent water accumulation and damage to safety-related equipment. The boundary begins at the credited floor drain and continues through the drain header and terminates at the oily waste yard header.

Also included in the license renewal scoping boundary of the Plant Drainage System are those water filled portions of nonsafety-related piping and equipment located in proximity to equipment performing a safety-related function. This includes the nonsafety-related portions of the Plant Drainage System located within the Primary Containment, Reactor Enclosure, Control Enclosure, Emergency Diesel Generator Enclosure, Spray Pond and Pump House, and Turbine Enclosure. 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 the plant drainage system are the roof drains on safety-related structures. The design roof load due to the probable maximum precipitation for all safety-related structures assumes maximum water depth based on blocked roof drains.

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). 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 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 emergency core cooling where the equipment provides coolant directly to the core. The Plant Drainage System includes safety-related check valves in the ECCS compartment drain lines to prevent flooding of the ECCS compartments as a result of backflow from the reactor enclosure floor drain sumps in the event that significant quantities of water are conveyed to the sumps. 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 is credited to mitigate the consequences of HELB and MELB events by providing flow paths for steam and water for pressurization and flooding considerations. The Plant Drainage System is also credited to mitigate the consequences of the probable maximum precipitation in safety-related valve pits. The Plant Drainage System provides secondary containment boundary. Plugs are installed in the radwaste drains in the reactor enclosure and refueling area HVAC (supply) area to maintain

secondary containment integrity. 10 CFR 54.4(a)(2)

3. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The Plant Drainage System contains nonsafety-related fluid filled lines in the Primary Containment, Reactor Enclosure, Control Enclosure, Emergency Diesel Generator Enclosure, Spray Pond and Pump House, and Turbine Enclosure which 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 Fire Protection (10 CFR 50.48). The Plant Drainage System is credited for Fire Protection to prevent water accumulation and damage to safety-related equipment. The Plant Drainage System is also credited to provide drainage away from plant buildings in the area of oil-filled transformers. 10 CFR 54.4(a)(3)

<u>UFSAR References</u>

2.4.2.3.4
3.4.1.1
3.6.1
9.3.3
9.5.1.2.12
Appendix 9A

<u>License Renewal Boundary Drawings</u>

LR-M-12, Sheet 1
LR-M-61, Sheet 1
LR-M-61, Sheet 2
LR-M-61, Sheet 4
LR-M-61, Sheet 5
LR-M-64, Sheet 1
LR-M-68, Sheet 1

Table 2.3.3-13 <u>Plant Drainage System</u>
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Flow Device	Leakage Boundary
	Pressure Boundary
Piping, piping components, and piping elements	Filter
	Leakage Boundary
	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

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

Table 3.3.2-13 Plant Drainage System
Summary of Aging Management Evaluation

2.3.3.14 Primary Containment Instrument Gas System

Description

The Primary Containment Instrument Gas (PCIG) System is a mechanical system designed to provide a supply of instrument gas of suitable quality and pressure for operation of pneumatic devices located inside the primary containment during normal operation. The PCIG System also is designed to provide a supply of instrument gas for long-term operation of the Automatic Depressurization System (ADS) valves following a design basis accident.

The purpose of the PCIG System is to provide a supply of instrument gas for operation of pneumatic devices located inside the primary containment. The PCIG System accomplishes this by drawing gas from inside the primary containment and processing it through filters, compressors, moisture separators, receivers, and dryers prior to distributing the gas to users inside the primary containment. For long-term operation of the ADS valves, safety-related instrument gas bottles are provided in the event the PCIG compressors are not available to support ADS operation.

The instrument gas lines that penetrate the primary containment are provided with safety-related containment isolation valves that automatically close on receipt of an isolation signal, except for the long-term bottled gas supply to the ADS valves. The containment isolation valves associated with the long-term gas supply to the ADS close to prevent back leakage if the gas header pressure and primary containment pressure differential is low. This isolation signal automatically resets, and the valves can be manually re-opened, when the differential pressure is restored.

The PCIG System contains components that are environmentally qualified. The function of providing instrument gas for long-term ADS valve operation is credited for Fire Safe Shutdown and Station Blackout coping.

For more detailed information see UFSAR Section 9.3.1.3.

Boundary

The PCIG System license renewal scoping boundary for the long-term instrument gas supply to the ADS valves begins at the instrument gas bottles and continues through pressure control valves, primary containment isolation valves, ADS gas accumulators, and terminates at the ADS valves. This boundary also includes piping, filters, and pressure control valves to allow for connection to an emergency diesel generator air start reservoir in the event the PCIG system is disabled as a result of a postulated fire.

The PCIG System license renewal scoping boundary for the instrument gas supply to the remaining pneumatic devices located inside the primary containment includes piping and valves necessary to achieve primary containment isolation.

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

Included in the license renewal scoping boundary of the PCIG System are those water filled portions of nonsafety-related piping and equipment located in proximity to equipment performing a safety-related function. This includes the nonsafety-related portions of the system located within the Reactor Enclosure. 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.

Also included in the license renewal scoping boundary of the PCIG System 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 scope of license renewal are the instrument gas compressor intake screen assemblies and the nonsafety-related gas supply piping to the non-ADS pneumatic devices located inside the primary containment. Also not included in the scope of license renewal are the nonsafety-related gas filters, moisture separators, dryers, receivers, and associated piping, components and instrumentation.

<u>Reason for Scope Determination</u>

The Primary Containment Instrument Gas 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 Instrument Gas 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 Instrument Gas 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 Primary Containment Instrument Gas 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 PCIG System includes safety-related containment isolation valves. 10 CFR 54.4(a)(1)

2. Provide motive power to safety-related components. The PCIG System provides a supply of instrument gas for long-term operation of the 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 PCIG System contains nonsafety-related water filled lines in the Reactor Enclosure which have potential spatial interactions with safety-related SSCs. The PCIG System 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 instrument gas for long-term 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 PCIG 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 function of providing instrument gas for long-term ADS valve operation is credited for Station Blackout coping. 10 CFR 54.4(a)(3)

UFSAR References

1.13
5.2.2.4
5.4.5.2
6.2
7.7.1.18.3.1
9.3.1.1
9.3.1.3
9.5.6.2
9A

License Renewal Boundary Drawings

LR-M-41, Sheet 2
LR-M-41, Sheet 5
LR-M-59, Sheet 1
LR-M-59, Sheet 2
LR-M-59, Sheet 3
LR-M-59, Sheet 4

Table 2.3.3-14 Primary Containment Instrument Gas System
Component Subject to Aging Management Review

Component Type	Intended Function
Accumulator (ADS)	Pressure Boundary
Accumulator (Instrument Gas Bottles)	Pressure Boundary
Bolting	Mechanical Closure
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
	Structural Support
Strainer (Element)	Filter
Valve Body	Leakage Boundary
	Pressure Boundary
	Structural Support

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

Table 3.3.2-14 Primary Containment Instrument Gas System
Summary of Aging Management Evaluation

2.3.3.15 Primary Containment Leak Testing System

Description

The Primary Containment Leak Testing (PCLT) System is a mechanical Auxiliary System that provides the ability to test the leakage of the Primary Containment structure, including containment penetrations, hatches, airlocks, and containment isolation valves, to verify that the leakage is within specified limits as required by 10 CFR 50 Appendix J. The PCLT System is in scope for license renewal. However, portions of the PCLT System are not required to perform intended functions and are not in scope.

Appendix J of 10 CFR 50 defines Type "A", "B", and "C" tests for Primary Containment Leakage Testing. The PCLT System consists of an Integrated Leak Rate Testing (ILRT) System for performing Type A tests; installed containment penetration test connections on electrical containment penetrations, personnel door airlocks, equipment hatches, and drywell head seal for performing Type B tests; and local leak rate test monitor equipment to measure containment penetration and containment isolation valve leakage for performing Type C tests.

The PCLT System consists of an ILRT data acquisition system panel, piping, and valving connected to the Primary Containment, temperature and moisture sensing elements, air compressors, compressed air cooling and filter skid, and a blowdown muffler. Since ILRT is performed on a periodic basis during shutdowns, only the data acquisition system, containment penetration and airlock connected piping, and valve components are permanently installed. The remaining components are stored when not in use. During the ILRT, compressed air is supplied to the components while data is recorded. At the conclusion of the test, the air test pressure is reduced by exhausting the pressurized air through the blowdown muffler.

Containment penetration test connections are installed on electrical containment penetrations, hatches, and the airlock whose design utilizes seals or gaskets. These penetrations are periodically pressurized with compressed air to test for leakage.

Containment isolation valves are also periodically pressurized with compressed air to test for leakage. Local test connections on the system piping adjacent to these valves are utilized for this testing. Local leak rate test monitors are connected during the testing to verify leakage monitoring test pressurization flow or test pressure decay.

For more detailed information, see UFSAR Sections 3.6.1, 6.2.4 and 6.2.6.

Boundary

The PCLT System license renewal scoping boundary consists of the ILRT primary containment isolation valves and associated piping; and the containment penetration test connections and associated valves and piping.

Also included in the license renewal scoping boundary of the PCLT System 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. Included in this boundary are components relied upon to preserve the structural support intended function of this portion of the system. Also included in the license renewal scoping boundary of the PCLT are those portions of nonsafety-related piping that are potentially liquid-filled (condensation) and relied upon to preserve the leakage boundary intended function. This includes drain connections for various test tap valves. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the boundary of this system are the electrical penetration assemblies which are evaluated with the Primary Containment Structure for license renewal considerations. Because of this administrative alignment, there are no EQ components in the PCLT System.

Also not included in the boundary of this system are the ILRT data acquisition system and supporting components, the cooling and filter skid and associated components, the blowdown muffler, and the ILRT temperature and moisture sensors. These components do not perform an intended function and are not in scope for license renewal.

Reason for Scope Determination

The Primary Containment Leak Testing 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 Leak Testing 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 Leak Testing 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 PCLT System contains manual valves that are 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 PCLT System contains nonsafety-related condensation-filled lines in the Reactor Enclosure that have the potential for spatial interaction with safety-related components, as well as seismic IIA piping that is relied upon to maintain structural integrity for the attached Seismic I components. 10 CFR 54.4(a)(2)

UFSAR References

3.6.1
6.2.4
6.2.6

License Renewal Boundary Drawings

LR-M-60, Sheet 1
LR-M-60, Sheet 2

Table 2.3.3-15 Primary Containment Leak Testing System
Component Subject to Aging Management Review

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

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

Table 3.3.2-15 Primary Containment Leak Testing System
Summary of Aging Management Evaluation

2.3.3.16 Primary Containment Ventilation System

Description

The Primary Containment Ventilation (PCV) System is a normally operating mechanical system that removes heat from and maintains air circulation in the primary containment, and provides cooling to other areas of the plant. The PCV System consists of two plant systems: the drywell ventilation system and the chilled water system. 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.

Drywell Ventilation System

The drywell ventilation system is a normally operating mechanical system that removes heat from the drywell during normal plant operations and maintains air circulation in the drywell under accident conditions. The function of maintaining a mixed atmosphere post accident is the only safety-related function of the system.

The drywell ventilation system consists of eight unit coolers and associated ducting and instrumentation. The coolers service key areas of the drywell, including the main steam relief area, the CRD area inside reactor pedestal, the drywell head area, the refueling bellows, and the biological shield. Four unit coolers are safety-related, and four unit coolers are nonsafety-related. Each unit cooler contains two redundant cooling coils and two redundant fans. One fan in each drywell unit cooler is normally operating, with the second fan in standby. The standby fan starts automatically when low air flow is sensed in the unit cooler discharge duct.

During normal plant operation, chilled water is supplied to the cooling coils by the chilled water system. During post accident conditions, the unit coolers operate to perform their safety-related function of maintaining the drywell atmosphere in a well mixed condition. Cooling water supply to the unit coolers is not needed for the mixing function.

Chilled Water System

The chilled water system provides chilled water to cool various components and air spaces in various areas of the plant. The chilled water system provides chilled water for cooling the air supply to the following areas: Drywell, Refuel Floor, Reactor Enclosure, Radwaste Enclosure, and Turbine Enclosure. The chilled water system provides chilled water to the recirculation pump motor air coolers, drywell equipment drain sump cooling coils, sample coolers, mechanical vacuum pump seal coolers, and the Unit 2 CRD repair room coolers; and is a backup source of water for the Reactor Enclosure Cooling Water system.

The chilled water system is a closed cooling system that consists of two pumps, two chiller skids, a head tank and a chemical feed tank. Water flows from each pump to a common header, and is directed through one of the two parallel chiller units. Flow then splits into four headers, two of which penetrate the primary containment and two which supply components and areas outside of the drywell. Inside the primary containment, chilled water is supplied to the drywell unit coolers, both recirc pump motor air coolers and the drywell equipment drain sump cooler. Outside primary containment, chilled water is provided to the other area ventilation systems and components. The chilled water head tank taps into the common return header providing a thermal surge volume and net positive suction head to the chilled water pumps. The chiller skids are a closed loop refrigerant system that extract heat from the chilled water system via the evaporator, and reject that heat to service water in the condenser.

For more detailed information, see UFSAR Sections 3.2, 3.5.1, 6.2, 9.4.5.2 and 9.2.10.

Boundary

The PCV license renewal scoping boundary consists of four safety-related drywell unit coolers, and their associated fans, dampers, ductwork, and controls. The PCV license renewal boundary also includes the primary containment isolation valves associated with the chilled water system, and the associated piping and instrumentation.

Also included in the license renewal scoping boundary of the PCV System are those water filled portions of nonsafety-related piping and equipment of the chilled water system located in proximity to equipment performing a safety-related function. This includes the following components: the chilled water head tank, chemical feed tank and associated components; and the chilled water supply to all drywell unit coolers, the drywell equipment drain sump cooling coils, the reactor enclosure sample station, the recirculation pump motor air coolers, and the Unit 2 CRD repair area coolers. It also includes the nonsafety-related portions of the chilled water system located within the Reactor Enclosure that supply the reactor enclosure air supply cooling coils and the refuel floor air supply cooling coils; and nonsafety-related portions of the chilled water system located within the main condenser compartment in the Turbine Enclosure. 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 four nonsafety-related drywell unit coolers and their associated fans, dampers and ductwork; the chilled water circulation pumps; the water chiller skids and associated components; and the portions of the chilled water system that supply cooling to components in the Turbine Enclosure (not located within the main condenser compartment) and Radwaste Enclosure. This portion of the PCV System does not perform an (a)(1), (a)(2) functional, or (a)(3) intended function. Additionally, it does not include water filled nonsafety-related piping and equipment located in proximity to equipment performing a safety-related function and therefore is not in scope for (a)(2) spatial interaction.

Reason for Scope Determination

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).

Intended Functions

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

2. Control combustible gas mixtures in the primary containment atmosphere. The PCV System is designed to maintain the drywell atmosphere in a thoroughly mixed condition following a LOCA to prevent stratification of hydrogen and oxygen that may be generated as a result of the accident. 10 CFR 54.4(a)(1)

3. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The PCV System contains nonsafety-related water filled lines in the Reactor Enclosure, Turbine Enclosure, and Primary Containment which have 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 Environmental Qualification (10 CFR 50.49). Portions of the PCV System are located in the drywell, and are environmentally qualified. 10 CFR 54.4(a)(3)

UFSAR References

3.5.1.1.1
6.2
9.2.10
9.4.5.2

License Renewal Boundary Drawings

LR-M-77, Sheet 1
LR-M-77, Sheet 2
LR-M-87, Sheet 1
LR-M-87, Sheet 2
LR-M-87, Sheet 3
LR-M-87, Sheet 4
LR-M-87, Sheet 5
LR-M-87, Sheet 6
LR-M-87, Sheet 7
LR-M-87, Sheet 8
LR-M-87, Sheet 9
LR-M-87, Sheet 10
LR-M-23, Sheet 4
LR-M-23, Sheet 7
LR-M-43, Sheet 1
LR-M-43, Sheet 3
LR-M-60, Sheet 1
LR-M-60, Sheet 2
LR-M-69, Sheet 1
LR-M-69, Sheet 2
LR-M-69, Sheet 3
LR-M-69, Sheet 4

Table 2.3.3-16 <u>Primary Containment Ventilation System</u>
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Ducting and Components	Leakage Boundary
	Pressure Boundary
Flexible Connection	Pressure Boundary
Flow Device	Leakage Boundary
Heat Exchanger Components (CRD Repair Room and CRD Repair Office Cooling Coils)	Leakage Boundary
Heat Exchanger Components (Drywell Unit Cooler Coils)	Leakage Boundary
Heat Exchanger Components (FWH Access Area Unit Cooler Tube Side Components)	Leakage Boundary
Heat Exchanger Components (Gaseous Radwaste Hydrogen Analyzer Sample Cooler Shell Side Components)	Leakage Boundary
Heat Exchanger Components (Reactor Enclosure and Refuel Floor Air Supply Cooling Coils)	Leakage Boundary
Heat Exchanger Components (Recirc Pump Motor Air Coolers)	Leakage Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Tanks	Leakage Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

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

Table 3.3.2-16 Primary Containment Ventilation System
Summary of Aging Management Evaluation

2.3.3.17 Process Radiation Monitoring System

Description

The Process Radiation Monitoring System is a normally operating system whose purpose is 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 nonsafety-related portions that are not required to perform intended functions are not in scope.

The safety-related portion of the system monitors the following plant processes:

- Main Steam Line
- Reactor Enclosure ventilation exhaust
- Refueling Area ventilation exhaust
- Control Room ventilation supply
- Control Room emergency fresh air supply
- Residual Heat Removal Service Water system
- North Stack Vent effluent (wide-range post accident monitoring)
- Drywell area (post-LOCA monitoring)

The nonsafety-related portion of the system monitors the following plant processes:

- Radwaste Equipment Rooms ventilation exhaust
- Charcoal Treatment System process exhaust
- Recombiner Rooms and Hydrogen Analyzer Compartments exhaust
- Steam Packing Exhauster discharge and Mechanical Vacuum Pump exhaust
- Radwaste Enclosure ventilation exhaust
- Air Ejector Off Gas effluent
- Primary Containment leak detection
- Hot Maintenance Shop ventilation exhaust
- Liquid Radwaste discharge
- Service Water
- Reactor Enclosure Cooling Water system
- South Stack Vent effluent
- North Stack Vent effluent (normal range)

Safety-Related radiation monitors:

The Main Steam Line radiation monitors indicate and record radiation levels external to the main steam lines and are located downstream of the outboard isolation valves. An abnormal condition is annunciated in the main control room, and an input is provided to the mechanical vacuum pump trip circuit in the off gas system.

The Reactor Enclosure ventilation exhaust radiation monitors indicate and record radiation levels in the reactor enclosure ventilation exhaust duct. The detectors are located in the duct upstream of the duct isolation valves. An abnormal condition is annunciated in the main control room, and inputs are provided to the reactor enclosure ventilation isolation circuits, primary containment isolation circuits, standby gas treatment and reactor enclosure recirculation system initiation circuits.

The Refueling Area ventilation exhaust radiation monitors indicate and record radiation levels in the refueling area exhaust duct. The detectors are located in the duct upstream of the duct isolation valves. An abnormal condition is annunciated in the main control room, and inputs are provided to the refueling area ventilation isolation circuits, primary containment isolation circuits, and standby gas treatment system initiation circuits.

The Control Room ventilation radiation monitors indicate and record radiation levels in the outside air supply to the main control room. The detectors are located in the control enclosure intake duct. An abnormal condition is annunciated in the main control room and inputs are provided as applicable to the control room ventilation isolation and emergency fresh air activation circuits.

The Control Room Emergency Fresh Air radiation monitors indicate and record radiation levels downstream of the control room ventilation HEPA charcoal filters. An abnormal condition is annunciated in the main control room.

The plant Residual Heat Removal (RHR) Service Water system (license renewal system: Safety Related Service Water System) radiation monitors indicate and record radiation levels in the return lines from the Unit 1 and Unit 2 RHR heat exchangers and in the combined loop return line to the spray pond or cooling tower. An abnormal condition is annunciated in the main control room and an input is provided to trip the RHR service water pumps.

The North Stack Vent effluent (wide-range accident) radiation monitors operate continuously to indicate and record radiation levels in the gases released through the North Stack Vent. Abnormal conditions are annunciated in the main control room, and an input is provided to the containment purge isolation valves for both Units 1 and 2.

The Drywell area post-LOCA radiation monitors provide indication and recording in the main control room of post-accident gross gamma radiation levels in the containment atmosphere. Abnormal conditions are annunciated in the main control room and an input is provided to the containment sump pump trip circuits.

Nonsafety-related radiation monitors:

The Radwaste Equipment Rooms ventilation exhaust radiation monitor continuously indicates and records radiation levels in the common duct that collects exhaust air from the charcoal off gas treatment equipment compartments ventilation ducts. Abnormal conditions are annunciated in the main control room.

The Charcoal Treatment System process exhaust radiation monitor continuously indicates and records radiation levels in the off gas process effluent that is exhausted to the North Stack. The exhaust piping is monitored to detect malfunction in the corresponding off gas train. Abnormal conditions are annunciated in the main control room.

The Recombiner Rooms and Hydrogen Analyzer Compartments exhaust radiation monitor continuously indicates and records radiation levels in the ventilation ducts from the recombiner compartments, drain sump rooms and hydrogen analyzer compartments before the exhaust air is ducted to the ventilation filters for release to the North Stack. Abnormal conditions are annunciated in the main control room.

The Steam Packing Exhauster discharge and Mechanical Vacuum Pump exhaust radiation monitor continuously indicates and records radiation levels in the discharge of the steam packing exhauster to the North Stack vent, and is capable of monitoring the mechanical vacuum pump exhaust discharge when this equipment is operating during startup. Abnormal conditions are annunciated in the main control room.

The Radwaste Enclosure ventilation exhaust radiation monitor provides general surveillance of radiation levels in the main exhaust duct of the radwaste enclosure to monitor gaseous effluents from equipment compartments and access areas prior to discharge to the North Stack.

The Air Ejector Off Gas effluent radiation monitor continuously indicates and records radiation levels in the main condenser off gas after it has passed through the steam jet air ejector condenser, recombiner, and aftercondenser. Abnormal conditions are annunciated in the main control room.

The Primary Containment leak detection radiation monitor continuously indicates and records radiation levels in the containment atmosphere to detect gaseous activity that may be indicative of reactor coolant pressure boundary leakage. Abnormal conditions are annunciated in the main control room.

The Hot Maintenance Shop ventilation exhaust radiation monitor continuously indicates and records radiation levels in the hot maintenance shop exhaust duct downstream of the HEPA filter. The monitor provides sampling of the flow in the duct for detection of particulate and iodine concentrations. Abnormal conditions are annunciated locally.

The Liquid Radwaste discharge radiation monitor continuously monitors the radiation level in the waste liquid discharged from the Radwaste System into the cooling tower blowdown line. The radiation level is indicated and abnormal conditions annunciated in the radwaste control room. An abnormal condition also results in an input to the effluent discharge valve isolation circuit.

The plant Service Water system (license renewal system: Nonsafety-Related Service Water System) radiation monitor continuously indicates and records radiation levels in the service water return flow to the cooling tower. Abnormal conditions are annunciated in the main control room.

The Reactor Enclosure Cooling Water System radiation monitor continuously indicates and records radiation levels in the system flow upstream of the pumps for radioactivity resulting from leakage into the system from cooled components. Abnormal conditions are annunciated in the main Control Room. When the drywell chilled water system is aligned to support the Reactor Water Cleanup System as an alternate method of decay heat removal, this monitor is inoperable and manual sampling is performed in accordance with plant procedures.

The South Stack Vent effluent radiation monitors continuously indicate radiation levels in gases and particulates released through the South Stack during normal plant operation. Indication is displayed locally and in the main control room. Abnormal conditions are annunciated in the main control room.

The North Stack Vent effluent (normal range) radiation monitors continuously indicate radiation levels in gases and particulates released through the North Stack during normal plant operation. Indication is displayed locally and in the main control room. Abnormal conditions are annunciated in the main control room.

For more detailed information, see UFSAR Sections 7.6.1.1, 7.7.1.9, and 11.5.

Boundary

The Process Radiation Monitoring System consists of both safety-related and nonsafety-related radiation monitoring as described above. For safety-related radiation monitoring, the electronic monitoring instrumentation and equipment is in the scope of license renewal and is evaluated as an electrical commodity. Monitoring equipment may consist of the area-type of monitor or may be installed directly on the system piping or ductwork being monitored; in either of those cases no piping or components are present or in scope for license renewal. For safety-related monitoring where piping and components are present to convey or condition the sample being monitored, these piping and components are included in scope for license renewal and are shown on the License Renewal Boundary Drawings, in green.

Also included in the license renewal scoping boundary of the Process Radiation Monitoring System are those liquid filled portions of piping and equipment for nonsafety-related monitoring that are located in proximity to equipment performing a safety-related function. This includes the nonsafety-related portions of the system located within the Reactor Enclosure. 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 license renewal scoping boundary is the balance of the system not included in the boundary descriptions above, as these portions of the system do not perform an (a)(1), (a)(2) functional, or (a)(3) intended function, and are not located in proximity to equipment performing a safety-related equipment such that spatial interaction could occur.

Nonsafety-related tubing interfacing with Seismic Class 1 supported components is not in-scope for structural support as the tubing is not capable of providing or adversely affecting support for a seismic component.

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 parameters for radiation level and initiates appropriate protective action to limit the potential release of radioactive materials if predetermined levels are exceeded. Actions can include inputs for primary containment isolation, component trip, etc. Reactor trip signals are not generated by the Process Radiation Monitoring System. 10 CFR 54.4 (a)(1)

2. Provide primary containment boundary. System lines penetrating primary containment are provided with isolation valves. 10 CFR 54.4 (a)(1)

3. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. Liquid filled portions of piping and equipment for nonsafety-related monitoring are located in proximity to equipment performing a safety-related function. This includes the nonsafety-related portions of the system located within the Reactor Enclosure. 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 components contained in the Environmental Qualification Program. 10 CFR 54.4(a)(3)

UFSAR References

7.6.1.1
7.7.1.9
11.5

License Renewal Boundary Drawings

LR-M-26, Sheet 1
LR-M-26, Sheet 2
LR-M-26, Sheet 3
LR-M-26, Sheet 4
LR-M-26, Sheet 5
LR-M-26, Sheet 6
LR-M-26, Sheet 7
LR-M-26, Sheet 8
LR-M-26, Sheet 9

Table 2.3.3-17 Process Radiation Monitoring System
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Flow Device	Pressure Boundary
Heat Exchanger Components	Leakage Boundary
Hoses	Leakage Boundary
	Pressure Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing	Leakage Boundary
	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

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

Table 3.3.2-17 Process Radiation Monitoring System
Summary of Aging Management Evaluation

2.3.3.18 Process and Post-Accident Sampling System

Description

The Process and Post-Accident Sampling System is a normally operating system consisting of the plant process sampling system and the plant post-accident sampling system. The system is designed to obtain representative samples from process streams and convey them to central sample stations for use in minimizing leakage, spillage, and potential radiation exposure to operational personnel. Where applicable, means are provided for sample cooling and for maintaining a fixed or measured sample flow rate.

The process sampling portion of the system provides capability for sampling various process systems during normal plant power operation and shutdown conditions. The post-accident portion of the system is designed to obtain representative liquid and gas grab samples from the primary coolant system and within primary and secondary containments for radiological and chemical analysis under accident conditions. The Process and 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 requirement to have and maintain the post-accident sampling system has been approved by plant license amendments.

The intended function of the Process and Post-Accident Sampling System for license renewal is to resist nonsafety-related failure by maintaining leakage boundary integrity to preclude system interactions with safety-related components, and to provide structural support where necessary for safety-related components. For this reason, the portions of this system that contain pressure retaining components located in proximity to other components performing safety-related functions, and portions where piping is physically connected to safety-related components are included in the scope of license renewal. The Process and Post-Accident Sampling System is not safety-related, and is not required to operate to support license renewal intended functions, however portions of the system are in scope for potential spatial interaction and structural support.

Process Sampling

Plant process sampling stations are located in the water treatment area, the yard near the cooling towers, and in the reactor, turbine, auxiliary boiler, and radwaste enclosures. The liquid radwaste and auxiliary boiler sample stations are common for Units 1 and 2.

Representative samples are drawn from process lines. The reactor enclosure and turbine enclosure 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 condensate drain tank, radwaste drains, or equipment drain system as appropriate, or in the case of the deep bed condensate demineralizer samples, the hotwell make-up/reject line.

Post-Accident Sampling

Gaseous and liquid samples capable of being taken by the post accident sampling system are the wetwell and drywell atmospheres, secondary containment atmosphere, reactor coolant, and suppression pool. Wetwell and drywell atmosphere samples are taken from the Containment Atmosphere Control System. Secondary containment atmosphere samples are taken from the vicinity of access doors to determine post accident accessibility of the reactor enclosure. Reactor coolant samples can be taken from the jet pump pressure instrumentation and Residual Heat Removal (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.

Samples are routed through the piping rack located in the reactor enclosure, and gas and liquid sampler assemblies located in the control enclosure. Gaseous samples are returned to the primary containment atmosphere or reactor enclosure as appropriate. Liquid samples and leakage collected in the sampling station sump are returned to the suppression pool.

For more detailed information, see UFSAR sections 9.3.2, 11.5.2.2.14, and 11.5.5.

Boundary

The Process and Post-Accident Sampling System is a nonsafety-related system. All system interfaces with systems that penetrate the containment occur downstream of the sampled system's containment isolation valves.

Included in the license renewal scoping boundary of the Process and Post-Accident Sampling System are those liquid filled portions of nonsafety-related piping and equipment located in proximity to equipment performing a safety-related function. This includes the nonsafety-related portions of the system located within the reactor enclosure. 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.

Also included in the license renewal scoping boundary of the Process and Post-Accident Sampling System 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. 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 Drawings for identification of this boundary, shown in red. System tubing is not included in this boundary as tubing is not capable of adversely affecting seismically-supported safety-related components.

Not included in the Process and Post-Accident Sampling System license renewal scoping boundary is the balance of the system not included in the boundary description above, as these portions of the system do not perform an (a)(1), (a)(2) functional, or (a)(3) intended function, and are not located in proximity to equipment performing a safety-related equipment such that spatial interaction could occur.

Also not included in the scope of license renewal for the Process and Post-Accident Sampling System are piping and components located within the sample enclosures surrounding the sample stations, piping racks, and sample chiller assemblies located in the reactor enclosure, turbine enclosure, and control enclosure 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. The sample enclosures are in scope and are evaluated as structural commodities.

Reason for Scope Determination

The Process and Post-Accident Sampling 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 Process and Post-Accident Sampling 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 and Post-Accident Sampling 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 Process and Post-Accident Sampling System contains nonsafety-related fluid filled lines within the reactor enclosure which have the potential for spatial interaction with safety-related SSCs, and contains nonsafety-related piping physically connected to safety-related components for which structural integrity is maintained. 10 CFR 54.4(a)(2)

UFSAR References

9.3.2
11.5.5

License Renewal Boundary Drawings

LR-M-05, Sheet 2
LR-M-05, Sheet 4
LR-M-23, Sheet 4
LR-M-23, Sheet 7
LR-M-30, Sheet 1
LR-M-30, Sheet 2
LR-M-51, Sheet 2
LR-M-51, Sheet 4
LR-M-52, Sheet 2
LR-M-52, Sheet 4
LR-M-57, Sheet 1
LR-M-57, Sheet 2
LR-M-57, Sheet 3
LR-M-57, Sheet 4

Table 2.3.3-18 Process and Post-Accident Sampling System
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Flow Device	Leakage Boundary
Hoses	Leakage Boundary
Piping, piping components, and piping elements	Leakage Boundary
Pump Casing	Leakage Boundary
Tanks	Leakage Boundary
Valve Body	Leakage Boundary

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

Table 3.3.2-18 Process and Post-Accident Sampling System
Summary of Aging Management Evaluation

2.3.3.19 Radwaste System

Description

The Radwaste System is a liquid, solid, and gaseous radioactive waste management system. The Radwaste System is designed to process all of the radioactive, or potentially radioactive, liquid, solid, and gaseous waste generated in the operation of the plant.

The Radwaste System consists of the following plant systems: Liquid Waste Management system, Solid Waste Management system, and Gaseous Waste Management system. 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 Waste Management system

The purpose of the Liquid Waste Management system is to process and dispose of, or recycle, all of the radioactive or potentially radioactive liquid wastes generated in the operation of the plant. The system accomplishes this by collecting, monitoring, processing, storing, disposing, or recycling of these wastes. The Liquid Waste Management system is divided into equipment drain, floor drain, chemical waste, and laundry drain subsystems so that the liquid wastes from various sources can be kept segregated and processed separately by the appropriate methods. Cross-connections between the subsystems provide additional flexibility for processing of the wastes by alternate methods. Operation of the Liquid Waste Management system is on a batch basis, as dictated by the waste generation rate of the plant.

The drywell equipment drain tank and drywell floor drain sump portions of the Liquid Waste Management System include process, instrumentation, and tank and sump vent lines that are provided with safety-related and environmentally qualified containment isolation valves. Containment isolation valves associated with the process lines automatically close on receipt of an isolation signal. Containment isolation valves associated with instrumentation lines are remote manually operated from the main control room. Containment isolation valves associated with tank and sump vent lines have been manually locked closed.

The drywell equipment drain tanks and drywell floor drain sumps and associated piping and components are located inside of the suppression chamber. The internal environment of this equipment communicates directly with the environment inside of the drywell through drain headers. Should the pressure boundary integrity of the drywell equipment drain tanks and drywell floor drain sumps and associated piping and components be compromised, this equipment becomes a potential drywell to suppression chamber leakage pathway. Because of this, the drywell equipment drain tanks and drywell floor drain sumps and their associated piping and components inboard of the systems containment isolation valves are considered an extension of the drywell boundary and are classified as safety-related to ensure their pressure boundary integrity.

Solid Waste Management system

The purpose of the Solid Waste Management system is to process and dispose of, or temporarily store, all of the radioactive solid wastes generated in the operation of the plant. The system accomplishes this by collecting, monitoring, processing, packaging, and providing temporary storage facilities for radioactive spent bead and powdered resins and dry solid wastes for offsite shipment and permanent disposal. The quantities of solid wastes generated are dependent on the plant operating factors. Redundant and backup equipment, alternative routes, and interconnections are included in the system to provide for operational occurrences such as refueling, abnormal leakage rates, decontamination activities, equipment downtime, maintenance and repair.

Gaseous Waste Management system

The purpose of the Gaseous Waste Management system is to process sources of airborne releases of radioactive material generated in the operation of the plant. The system accomplishes this by collecting and delaying the release of noncondensable radioactive gases removed from the main condenser through the use of catalytic recombination and selective adsorption of fission product gases. The Gaseous Waste Management system includes sufficient capacity and redundancy to accommodate all anticipated processing requirements of the plant.

For more detailed information see UFSAR Sections 9.3.3, 11.2, 11.3, and 11.4.

<u>Boundary</u>

The Radwaste System license renewal scoping boundary includes those portions of the Liquid Waste Management System necessary to achieve primary containment isolation. For the tank and sump outlet process lines, the boundary begins with the inboard containment isolation valves and continues up to and includes the outboard containment isolation valves. For the instrumentation lines, the boundary begins with the containment isolation valves, continues to the tank and sump level instrumentation, and includes the level instrumentation reference leg piping. For the tank and sump vent lines, the boundary begins with the containment isolation valves and includes the capped connection outboard of the isolation valves.

Also included in the license renewal scoping boundary are the drywell equipment drain tanks and drywell floor drain sumps and their associated piping and components inboard of the systems containment isolation valves. This portion of the system is considered an extension of the drywell boundary and begins at the floor and equipment drain header seal plates at the drywell floor, continues through the drywell equipment drain tanks and drywell floor drain sumps, and terminates at the inboard side of the inboard containment isolation valves.

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

Included in the license renewal scoping boundary of the Radwaste System 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 no longer in proximity to equipment performing a safety-related function, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Enclosure. 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.

Also included in the license renewal scoping boundary of the Radwaste System are those water filled portions of nonsafety-related piping and equipment located in proximity to equipment performing a safety-related function. This includes the nonsafety-related portions of the Radwaste System located within the Primary Containment, Reactor Enclosure, Control Enclosure, Auxiliary Boiler Enclosure Tunnel, and Turbine Enclosure. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. The portions of the Radwaste System located in the Radwaste Enclosure are not in scope as these portions of the system do not have potential spatial interactions with safety-related SSCs. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the scope of the Radwaste System are the radwaste floor and equipment drain sump pits which are evaluated with their applicable structure for license renewal. Also not included in the scope of the Radwaste System are the floor and equipment drain lines which provide the input into the Liquid Waste Management system. The floor and equipment drains are evaluated in the Plant Drainage System.

<u>Reason for Scope Determination</u>

The Radwaste 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 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 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 Radwaste 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 Radwaste System includes safety-related primary containment isolation valves and piping. 10 CFR 54.4(a)(1)

2. Provide emergency heat removal from the primary containment and provide containment pressure control. The drywell equipment drain tanks and drywell floor drain sumps and their associated piping and components inboard of the systems containment isolation valves are considered an extension of the drywell boundary and are classified as safety-related to protect against drywell to suppression chamber leakage. 10 CFR 54.4(a)(1)

3. 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 Primary Containment, Reactor Enclosure, Control Enclosure, Auxiliary Boiler Enclosure Tunnel and Turbine Enclosure 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 Radwaste System contains components that are environmentally qualified. 10 CFR 54.4(a)(3)

UFSAR References

1.8
1.11
1.13
3.2
5.2.5.2.1.3
6.2
9.3.3
11.2
11.3
11.4

License Renewal Boundary Drawings

LR-M-05, Sheet 1
LR-M-05, Sheet 3
LR-M-08, Sheet 2
LR-M-26, Sheet 2
LR-M-26, Sheet 8
LR-M-42, Sheet 1
LR-M-42, Sheet 3
LR-M-45, Sheet 1
LR-M-45, Sheet 2
LR-M-53, Sheet 1
LR-M-61, Sheet 1
LR-M-61, Sheet 2
LR-M-61, Sheet 4
LR-M-61, Sheet 5
LR-M-62, Sheet 1
LR-M-64, Sheet 1
LR-M-66, Sheet 1
LR-M-67, Sheet 1
LR-M-67, Sheet 5
LR-M-69, Sheet 1
LR-M-69, Sheet 2
LR-M-69, Sheet 3
LR-M-69, Sheet 4
LR-M-90, Sheet 1

Table 2.3.3-19 Radwaste System
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Flow Device	Leakage Boundary
Heat Exchanger Components (Gaseous Radwaste Aftercondenser Shell Side Components)	Leakage Boundary
Heat Exchanger Components (Gaseous Radwaste Hydrogen Analyzer Sample Cooler Tube Side Components)	Leakage Boundary
Heat Exchanger Components (Gaseous Radwaste Preheater Shell Side Components)	Leakage Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing (Condensate Backwash Transfer Pumps)	Leakage Boundary
Recombiners (Gaseous Radwaste)	Leakage Boundary
Tanks (Condensate Backwash Receiving Tanks)	Leakage Boundary
Tanks (Drywell Floor Drain Sump and Drywell Equipment Drain Tank)	Pressure Boundary
Tanks (Gaseous Radwaste Hydrogen Analyzer Surge Tank Assemblies)	Leakage Boundary
Tanks (Reactor Water Cleanup Backwash Receiving Tanks)	Leakage Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

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

Table 3.3.2-19 Radwaste System
Summary of Aging Management Evaluation

2.3.3.20 Reactor Enclosure Ventilation System

Description

The Reactor Enclosure Ventilation (REV) System is a normally operating mechanical system that provides ventilation and maintains environmental conditions to areas inside the Reactor Enclosure during normal plant operation. The system also maintains the Reactor Enclosure at a negative pressure to prevent exfiltration of potentially contaminated air, filters air exhausted from areas of potential contamination, and isolates supply and exhaust ducts of affected rooms following a High Energy Line Break. The REV System is in scope for license renewal. However, portions of the REV System are not required to perform intended functions and are not in scope.

During normal plant operation, the REV System provides ventilation to the Reactor Enclosure and Refueling Area. Upon receipt of an automatic initiation signal (such as LOCA, high radiation, low ventilation differential pressure), the normal REV supply and exhaust flowpaths are isolated, and the Standby Gas Treatment System (SGTS) license renewal system provides this function.

The REV System consists of the following subsystems: Reactor Enclosure Air Supply and Exhaust, Refueling Area Air Supply and Exhaust, Reactor Enclosure Equipment Compartment Exhaust, North and South Stack Radiation Monitoring Room Ventilation, Emergency Core Cooling System and Reactor Core Isolation Cooling Pump Room Unit Coolers, Steam Flooding Dampers Isolation, and Electric and Steam Unit Heaters.

Reactor Enclosure Air Supply and Exhaust subsystem

This subsystem is a nonsafety-related system which provides air to and exhausts air from areas in the Reactor Enclosure. The subsystem consists of supply and exhaust fans, cooling and heating coils, roll filters, and associated controls and instrumentation. Outside air passes through the roll filter, across the heating coils and cooling coils, and through the air supply fans and isolation valves, to the supply ductwork to various Reactor Enclosure locations. The Reactor Enclosure exhaust air ductwork is equipped with radiation monitors and isolation valves. The exhaust fans operate to maintain a negative pressure in the Reactor Enclosure, and direct the subsystem exhaust to the South Vent Stack. This subsystem also contains an equalizing duct to provide a flowpath between the Reactor Enclosure and the refueling area ventilation zones while the reactor cavity shield plugs are being removed and installed during refueling activities.

The portions of this subsystem that are in the scope of license renewal are the equalizing ductwork, and various ductwork drain lines which are relied upon to provide a leakage boundary. The remainder of this subsystem does not perform an intended function for license renewal.

Refueling Area Air Supply and Exhaust subsystem

This subsystem is a nonsafety-related system which provides air to and exhausts air from the common refueling area in the Reactor Enclosure. The subsystem consists of supply and exhaust fans, cooling and heating coils, roll filters, and associated controls and instrumentation. Outside air passes through the roll filter, across the heating and cooling coils, and through the air supply fans and isolation valves, to the supply ductwork to the refueling area. The exhaust air ductwork is equipped with radiation monitors and isolation valves. The exhaust fans operate to maintain a negative pressure in the refueling area, and direct the subsystem exhaust to the South Vent Stack. This subsystem does not perform an intended function for license renewal, except for the ductwork drain lines which are relied upon to provide a leakage boundary.

Reactor Enclosure Equipment Compartment Exhaust (REECE) subsystem

The REECE subsystem is a nonsafety-related system which filters and exhausts air from various equipment compartments in the Reactor Enclosure. The REECE filter trains consist of prefilters, HEPA filters and charcoal filters. Additionally, the reactor water cleanup backwash tank vent has a dedicated filter assembly. The REECE fans exhaust the air from the equipment compartment areas through the filter trains, through ductwork equipped with radiation monitors and isolation valves, and directs the exhaust to the South Vent Stack. This subsystem does not perform an intended function for license renewal, except for the filter plenum drain lines which are relied upon to provide a leakage boundary.

North and South Stack Radiation Monitoring Room Ventilation subsystem

This subsystem is a nonsafety-related system that provides air to the North Stack and South Stack radiation monitoring rooms. The system air handling units consist of filters, heating coils, and fans. The supply and exhaust ducts are equipped with balancing dampers to adjust flow as necessary. This subsystem does not perform an intended function for license renewal.

Emergency Core Cooling System (ECCS) and Reactor Core Isolation Cooling (RCIC) Pump Room Unit Coolers subsystem

This subsystem is a safety-related system which provides supplemental ventilation and cooling whenever the ECCS and RCIC pumps are running or upon high compartment temperature. The safety-related unit coolers serve the RHR, Core Spray, HPIC, and RCIC pump compartments. Additionally, the system provides nonsafety-related unit coolers to the Unit 1 control rod drive decon room, the Unit 2 CRD Repair Room, and the Unit 2 CRD repair office. This subsystem is in the scope of license renewal.

Steam Flooding Dampers Isolation subsystem

This subsystem is a safety-related system which provides isolation for areas containing high energy pipes. Each supply and return duct for compartments containing high energy piping is provided with redundant steam flooding isolation dampers. Each steam flooding damper uses pressure sensing instrumentation to automatically close the damper upon sensing a high pressure developed inside the compartment. This subsystem is in the scope of license renewal.

Electric and Steam Unit Heaters subsystem

This subsystem is a nonsafety-related system that consists of individual unit heaters installed in various areas to provide supplemental heating as required. Areas served include the refueling area, ventilation equipment area, safeguard system access area, CRD equipment and repair area, CRD equipment access area, railway airlock, and other operating and personnel areas. This subsystem does not perform an intended function for license renewal.

For more detailed information, see UFSAR Sections 3.5.1.1.1, 9.4.2, and 9A.2.5.

Boundary

The SGTS license renewal system recirculates air through the same flowpath that is utilized by the REV system normal ventilation flowpath. Therefore, both systems have some equipment in common. For the purposes of license renewal evaluation, the shared ductwork is evaluated with the SGTS System. The Reactor Enclosure area and room cooling and ventilation equipment, the steam flooding isolation dampers, and the associated controls and circuitry are part of the REV System license renewal boundary. The exhaust ductwork radiation monitors are evaluated with the Process Radiation Monitoring System.

The REV System license renewal scoping boundary consists primarily of the ECCS and RCIC Pump Room Unit Coolers subsystem and the Steam Flooding Dampers Isolation subsystem, including associated ductwork, instrumentation and controls. It also includes the equalizing ductwork penetrating the reactor cavity on elevation 313 feet and the electrically heat-traced drain piping on the Unit 2 Reactor Enclosure air exhaust fan discharge to the South Vent Stack.

The REV System includes only the air side of the safety-related ECCS and RCIC pump room unit coolers. The cooling water side of these room unit coolers is part of the Safety Related Service Water license renewal system, and is evaluated for aging management considerations with that system.

Also included in the license renewal scoping boundary of the REV System are those portions of nonsafety-related piping that are liquid-filled and relied upon to preserve the leakage boundary intended function. Included in this boundary are various ductwork and filter plenum drain lines. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the license renewal boundary of the REV System are the Reactor Enclosure Air Supply and Exhaust subsystem, the Refueling Area Air Supply and Exhaust subsystem, the REECE subsystem, the North and South Stack Radiation Monitoring Room Ventilation subsystem, the nonsafety-related room unit coolers, the Electric and Steam Unit Heaters subsystem, and the heat tracing on the drain piping from the Unit 2 South Vent Stack discharge duct. This equipment does not perform an intended function for license renewal, and is not in scope for this system.

Also not included in the boundary of this system is the fire protection deluge system supply piping to the REV System charcoal filters. The LGS design provides fire detection and suppression for the charcoal filters in all of the plant ventilation systems. Since this is a fire protection system function and not a ventilation system function, these components are evaluated with the Fire Protection System for license renewal.

Reason for Scope Determination

The Reactor Enclosure 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 Reactor Enclosure 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 Reactor Enclosure 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 Reactor Enclosure 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 secondary containment boundary. The steam isolation dampers isolate supply and exhaust ducts of compartments containing high energy pipes after a pipe break. 10 CFR 54.4(a)(1)

2. Maintain emergency temperature limits within areas containing safety-related components. The REV System maintains temperatures in the ECCS and RCIC pump rooms such that essential equipment in those rooms remains operable. 10 CFR 54.4(a)(1)

3. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The REV System contains nonsafety-related water filled lines in the Reactor Enclosure that have the potential for spatial interactions (spray or leakage) 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 safety-related ECCS and RCIC pump room unit coolers are required to operate during a fire 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). Certain safety-related REV System components are in located in potentially harsh environments and 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 REV System provides ventilation for equipment that is required to operate during a Station Blackout scenario. 10 CFR 54.4(a)(3)

UFSAR References

3.5.1.1.1
9.4.2
9.A.2.5

License Renewal Boundary Drawings

LR-M-76, Sheet 1
LR-M-76, Sheet 2
LR-M-76, Sheet 3
LR-M-76, Sheet 4
LR-M-76, Sheet 5
LR-M-76, Sheet 7
LR-M-76, Sheet 8
LR-M-76, Sheet 9
LR-M-76, Sheet 10

Table 2.3.3-20 Reactor Enclosure Ventilation System
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Ducting and Components	Leakage Boundary
	Pressure Boundary
Flexible Connection	Pressure Boundary
Flow Device	Leakage Boundary
Heat Exchanger Components (Core Spray Pump Room Unit Cooler Air Side Components)	Heat Transfer
	Pressure Boundary
Heat Exchanger Components (HPCI Pump Room Unit Cooler Air Side Components)	Heat Transfer
	Pressure Boundary
Heat Exchanger Components (RCIC Pump Room Unit Cooler Air Side Components)	Heat Transfer
	Pressure Boundary
Heat Exchanger Components (RHR Pump Room Unit Cooler Air Side Components)	Heat Transfer
	Pressure Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary

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

Table 3.3.2-20 Reactor Enclosure Ventilation System
Summary of Aging Management Evaluation

2.3.3.21 Reactor Water Cleanup System

Description

The Reactor Water Cleanup (RWCU) System is a high-pressure filtration and demineralization system designed to maintain reactor coolant purity. The RWCU system may be operated at any time during reactor operations (normal, hot standby, startup, shutdown, and refueling), or it may be shut down if water quality is within the Technical Specification limits.

The purpose of the RWCU System is to: remove solid and dissolved impurities from reactor coolant; blowdown excess reactor coolant during startup, shutdown, and hot standby conditions to the main condenser, condensate storage tank (CST), or equipment drain collection tank; and minimize temperature gradients in the main recirculation piping and RPV during periods when the main recirculation pumps are unavailable. The RWCU System accomplishes these purposes by forced circulation of reactor coolant through heat exchangers and filter-demineralizers.

The RWCU System includes a safety-related remote manually operated spring assisted check valve and a simple check valve in the RWCU return line to feedwater to provide instantaneous reverse flow isolation. The spring assisted check valve is a containment isolation valve that can be remote manually closed for long-term leakage control.

The RWCU System is a high energy system and includes safety-related and environmentally qualified 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 isolate the suction of the RWCU System from the reactor coolant pressure boundary.

The RWCU System blowdown lines to the main condenser and equipment drain collection tank, and, the sample lines for the filter demineralizers, include valves credited as high to 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 (evaluated with the Reactor Coolant Pressure Boundary). The boundary continues through the RWCU recirculation pumps (3), the tube side of the regenerative heat exchanger, the tube side of the non-regenerative heat exchangers (2) (the shell sides are evaluated with the Closed Cooling Water System, the cleanup filter demineralizers (2) including associated backwash and precoat equipment, shell side of the regenerative heat exchanger, RWCU return containment isolation check valve, and ends at the attachments to the Feedwater System and the Reactor Core Isolation Cooling System. The RWCU System license renewal scoping boundary includes blowdown lines to the main condenser (evaluated with the Condenser and Air Removal System), condensate storage tank (evaluated with the Condensate System), and equipment drain collection tank (evaluated with the Radwaste System). All associated piping, components and instrumentation contained within the boundary described above are also included in the RWCU System scoping boundary.

Included in the RWCU System license renewal scoping boundary is a noble metals monitoring system consisting of an Electrochemical Corrosion Potential (ECP) monitor which measures the electrochemical corrosion potential of the reactor water with respect to the piping, and, a durability monitor which provides a source of tubing samples which can be analyzed to determine the surface density and wear rate of the deposition of the noble metals. A data acquisition system collects and stores the flow, temperature and ECP data from the noble metals monitoring system.

Also included in the license renewal scoping boundary of the RWCU System 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 no longer in proximity to equipment performing a safety-related function, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Enclosure and Turbine Enclosure. 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.

The RWCU plant system includes reactor coolant pressure boundary and containment isolation piping and components in the suction portion of the system. The reactor coolant pressure boundary and containment isolation piping and components associated with the suction portion of the system are evaluated as part of the Reactor Coolant Pressure Boundary license renewal system.

The RWCU System includes safety-related flow elements and instrumentation for the determination of RWCU System high differential flow. These components are evaluated as part of the RWCU System. The flow elements and instrumentation provide input to the RWCU System high differential flow subsystem of the plants Reactor Water Cleanup Leak Detection system, which is included in the Plant Leak Detection and Radiation Monitoring System license renewal system.

Reason for Scope Determination

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).

Intended Functions

1. Provide primary containment boundary. The RWCU System includes a safety-related remote manually operated spring assisted check valve and a simple check valve in the RWCU return line to feedwater to provide instantaneous reverse flow isolation. The spring assisted

check valve is a containment isolation valve and is remote manually closed for long-term leakage control. 10 CFR 54.4(a)(1)

2. 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 isolate the RWCU system from the reactor coolant pressure boundary. 10 CFR 54.4(a)(1)

3. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The RWCU System contains nonsafety-related high energy lines in the Reactor Enclosure and Turbine Enclosure 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 Fire Protection (10 CFR 50.48). The RWCU System blowdown lines to the main condenser and equipment drain collection tank, and, the sample lines for the filter demineralizers, include valves credited as high to low pressure interfaces 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 RWCU System safety-related flow instrumentation for the determination of RWCU System high differential flow is environmentally qualified. 10 CFR 54.4(a)(3)

<u>UFSAR References</u>

1.2.4.1.5
1.13
3.2
Table 3.2-1
3.6.1.2.1.5
3.9.3.1.16
5.4.8
6.2
7.1.2.1.20
7.6.1.3.3.4
7.6.1.8.3.5.1
7.7.1.8
7.7.2.8

<u>License Renewal Boundary Drawings</u>

LR-M-44, Sheet 1
LR-M-44, Sheet 2
LR-M-44, Sheet 3
LR-M-44, Sheet 4
LR-M-45, Sheet 1
LR-M-45, Sheet 2
LR-M-41, Sheet 1
LR-M-41, Sheet 4

LR-M-43, Sheet 1
LR-M-05, Sheet 1
LR-M-05, Sheet 3
LR-M-08, Sheet 2
LR-M-08, Sheet 3
LR-M-62, Sheet 1
LR-M-46, Sheet 1
LR-M-46, Sheet 2
LR-M-23, Sheet 4
LR-M-23, Sheet 7

Table 2.3.3-21 Reactor Water Cleanup System
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Flow Device	Leakage Boundary
Heat Exchanger Components ("A" RWCU Pump Motor Heat Exchanger Shell Side Components)	Leakage Boundary
Heat Exchanger Components ("B" and "C" RWCU Pump Seal Heat Exchanger Tube Side Components)	Leakage Boundary
Heat Exchanger Components (Non-Regenerative Heat Exchanger Tube Side Components)	Leakage Boundary
Heat Exchanger Components (Regenerative Heat Exchanger Tube and Shell Side Components)	Leakage Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing ("A" RWCU Pump)	Leakage Boundary
Pump Casing ("B/C" RWCU Pump)	Leakage Boundary
Pump Casing (Filter Demineralizer Precoat and Holding)	Leakage Boundary
Tanks (Filter Demineralizer)	Leakage Boundary
Tanks (Precoat)	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 Service Water System

Description

The Safety-Related Service Water (SRSW) System is a standby mechanical system designed to remove heat from the primary containment, from areas containing ECCS equipment in the Reactor Enclosure, and from safety-related plant equipment. The Safety-Related Service Water System consists of the following plant systems: Residual Heat Removal Service Water (RHRSW) system, the Emergency Service Water (ESW) system, and the RHR heat exchanger tube corrosion monitoring subsystem. The SRSW is in scope for license renewal. However, portions of the SRSW System are not required to perform intended functions and are not in scope.

RHRSW system

The purpose of the RHRSW system is to provide cooling water for removing heat from the Residual Heat Removal (RHR) heat exchangers. The RHRSW system accomplishes this by providing flow from the spray pond (ultimate heat sink) to the RHR heat exchangers and returning flow to the spray pond via spray nozzles. The RHRSW system transfers heat from the RHR system to the heat sink during operation in the following plant conditions: normal shutdown, emergency shutdown, hot standby, refueling, and normal operation.

The RHRSW system can also function as a water supply to the RHR System under extreme emergency conditions.

The RHRSW system can be operated in the spray mode for spray pond cooling.

The RHRSW system consists of two independent parallel flow loops serving both units. Each flow loop contains two RHRSW pumps which discharge into a common header that serves one RHR heat exchanger on Unit 1 and one RHR heat exchanger on Unit 2. Return flow to the spray pond spray networks is through a common header that is also used for the ESW system return.

ESW system

The purpose of the ESW system is to remove heat from safety-related plant equipment when the normal cooling system is unavailable. The ESW system accomplishes this by providing cooling water to essential plant equipment during a loss of off-site power condition (LOOP) or during design basis accidents. The ESW system provides cooling water to the emergency diesel generator (EDG) heat exchangers, ECCS equipment room coolers, RCIC room coolers, control structure chillers, and RHR pump motor oil coolers.

The system consists of two independent loops with two pumps per loop. Cooling water is pumped from the spray pond to the users and returned to the spray pond via RHRSW return lines to spray nozzles.

The ESW system is capable of providing emergency makeup to the spent fuel pool.

The ESW system is also capable of providing cooling water flow to selected nonsafety-related plant equipment.

RHR Heat Exchanger Tube Corrosion Monitoring subsystem

The purpose of the RHR heat exchanger tube corrosion monitoring system was to duplicate process conditions in the RHR heat exchanger tubes (service water side) to predict pit growth in the tube material. It accomplished this purpose by providing a side-stream of service water through tube specimens that were periodically removed for analysis. The system was installed following the discovery of degradation of the Unit 1 304 stainless tube material. The tubes in the Unit 1 RHR heat exchangers have been replaced with AL6XN stainless steel material and the corrosion monitoring system is no longer necessary and is not in service. Portions of the system have been physically disconnected from the service water system while other portions have been isolated from the active portion of the RHRSW system by closed valves.

For more detailed information see UFSAR Sections 3.1, 3.2, 7.1.2, 7.3.1, 7.3.2, 7.4, 7.6, 9.2.2, 9.2.3, and 9.2.6.

<u>Boundary</u>

The Safety-Related Service Water System license renewal scoping boundary includes those portions of the system necessary for the removal of decay heat from the reactor vessel and primary containment, removal of heat from safety-related equipment and areas containing safety-related equipment.

The RHRSW system scoping boundary begins with the RHRSW pumps in the Spray Pond Pump House and includes piping to and from the RHR heat exchangers and spray networks and nozzles at the spray pond. This boundary includes piping and tubing to and from the RHRSW radiation monitors. Also included are portions of the piping to the Spray Pond Pump House from the cooling towers and Schuylkill River makeup header.

The ESW system scoping boundary begins with the ESW pumps in the Spray Pond Pump House and includes piping to and from the EDG heat exchangers, control structure chillers, RHR pump motor oil coolers, HPCI room coolers, RCIC room coolers, RHR room coolers and core spray room coolers. The cooling water side of the ECCS room coolers is includes in the scoping boundary for the SRSW System. The air side of the room coolers, including ducting, fan and coil housings and drip pans, is evaluated with the Reactor Enclosure Ventilation System. Also included is cross-tie piping to the safety-related to nonsafety-related interface with the NSSW System. Sluice gates for the pump bay intake are evaluated as part of the Spray Pond Pump House structure.

The RHR heat exchanger tube corrosion monitoring subsystem is not in scope for license renewal except for the supply and return piping from the SRSW System, including the closed double valves that isolate this inactive system from the active SRSW System.

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

Also included in the license renewal scoping boundary of the Safety Related Service Water System are those portions of nonsafety-related piping equipment that extend beyond the safety-related to nonsafety-related interface up to the location of the first seismic anchor, or to a point no longer in proximity to equipment performing a safety-related function, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Enclosure, EDG Enclosure, and Control Enclosure. 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.

Reason for Scope Determination

The Safety Related Service 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 Safety Related Service 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 Safety Related Service 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 Safety Related Service 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 Safety Related Service 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 Safety Related Service Water System removes heat from the RHR heat exchangers 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 Safety Related Service Water System removes heat from the RHR heat exchangers during transient and accident conditions. 10 CFR 54.4(a)(1)

4. Maintain emergency temperature limits within areas containing safety-related components. The Safety Related Service Water System removes heat from secondary containment equipment compartments that house ECCS components and RHR pump motor oil coolers. 10 CFR 54.4(a)(1)

5. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The Safety Related Service Water system contains nonsafety-related fluid filled lines in the Reactor Enclosure, Diesel Generator Enclosure, Control Enclosure and Spray Pond Pump House which provide structural support or have potential spatial interactions with safety-related SSC. 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 Fire Protection (10 CFR 50.48). The Safety Related Service 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)

7. 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 Safety Related Service Water System includes components that are environmentally qualified. 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 Safety Related Service 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

3.1
3.2
7.1.2
7.3.1
7.3.2
7.4
7.6
9.2.2
9.2.3
9.2.6

License Renewal Boundary Drawings

LR-M-11, Sheet 1
LR-M-11, Sheet 2
LR-M-11, Sheet 3
LR-M-11, Sheet 4
LR-M-11, Sheet 5
LR-M-12, Sheet 1
LR-M-12, Sheet 2
LR-M-13, Sheet 1
LR-M-13, Sheet 2
LR-M-26, Sheet 4
LR-M-51, Sheet 2
LR-M-51, Sheet 4
LR-M-51, Sheet 6
LR-M-51, Sheet 8
LR-M-53, Sheet 1
LR-M-53, Sheet 3
LR-M-68, Sheet 1

Table 2.3.3-22 Safety Related Service Water System
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Expansion Joints (EDG HTX)	Pressure Boundary
Expansion Joints (RHR motor oil cooler)	Pressure Boundary
Flow Device	Leakage Boundary
Heat Exchanger Components (ECCS Room Coolers)	Heat Transfer
	Pressure Boundary
Heat Exchanger Components (EDG HTX)	Heat Transfer
	Pressure Boundary
Heat Exchanger Components (MCR Chiller Condenser)	Heat Transfer
	Pressure Boundary
Heat Exchanger Components (RHR HTX)	Heat Transfer
	Pressure Boundary
Heat Exchanger Components (RHR Pump Motor Oil Cooler)	Heat Transfer
	Pressure Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing	Pressure Boundary
Spray Nozzles	Spray
Valve Body	Pressure Boundary

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

Table 3.3.2-22 Safety Related Service Water System
Summary of Aging Management Evaluation

2.3.3.23 Spray Pond Pump House Ventilation System

Description

The Spray Pond Pump House Ventilation (SPPV) System is a normally operating safety-related mechanical system that provides ventilation, heating, cooling, and control of environmental conditions in the Spray Pond Pump House. The SPPV System provides ventilation and cooling in the Spray Pond Pump House under normal plant operating conditions and following design basis events; provides heating under normal plant operating conditions; and provides suitable environmental conditions for the ESW and RHRSW pumps and their accessories. The SPPV System outdoor air intake is equipped with louvers, air plenums, and mixing boxes which combine outdoor air and return air. This air is then heated if required, and supplied to the pump structure via the Spray Pond Pump Structure supply fans. Exhaust air is discharged through two wall louvers. Dampers are installed throughout the system to balance the air flow as necessary. Cooling is accomplished by adjusting the mix of fresh air and recirculated air. The electric heaters installed in the Spray Pond Pump Structure supply fan suction do not perform a safety-related function, and are not in the scope of license renewal. For more detailed information, see UFSAR Sections 3.5.1.1.1 and 9.4.7.

Boundary

The SPPV System license renewal scoping boundary begins at the outside air intake; includes the associated air mixing boxes; continues through the associated dampers, fans and instrumentation; and discharges through the exhaust wall louvers. The intake louvers and missile barriers are part of the Spray Pond and Pump House license renewal system. The electric heaters are not required to support intended functions and are not included within the scope of license renewal.

Reason for Scope Determination

The Spray Pond Pump House 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 Spray Pond Pump House 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 Spray Pond Pump House 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) and Station Blackout (10 CFR 50.63). The Spray Pond Pump House 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 Environmental Qualification (10 CFR 50.49) and Anticipated Transient Without Scram (10 CFR 50.62).

Intended Functions

1. Maintain emergency temperature limits within areas containing safety-related components. The SPPV System maintains environmental conditions by providing ventilation and cooling to ensure that the operability of safety-related equipment located in the Spray Pond Pump House is maintained following design basis events. 10 FCR 54.4(a)(1)

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 SPPV System provides ventilation for equipment that is required to operate during a Fire Safe Shutdown event. 10 FCR 54.4(a)(3)

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 SPPV System provides ventilation for equipment that is required to operate during a Station Blackout scenario. 10 CFR 54.4(a)(3)

<u>UFSAR References</u>

3.5.1.1.1
9.4.7

<u>License Renewal Boundary Drawings</u>

LR-M-81, Sheet 1

Table 2.3.3-23 Spray Pond Pump House Ventilation System Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Ducting and Components	Pressure Boundary
Flexible Connection	Pressure Boundary

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

Table 3.3.2-23 Spray Pond Pump House Ventilation System Summary of Aging Management Evaluation

2.3.3.24 Standby Liquid Control System

Description

The Standby Liquid Control System (SLCS) is a standby sodium pentaborate injection system that is used 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 capabilities. The SLCS operates independently from the Control Rod Drive (CRD) System. The most severe requirement for which the system is designed is shutdown from a full power operating condition assuming complete failure of the CRD System to respond to a scram signal.

The purpose of the SLCS is to shutdown the reactor independent of the control rod drive system and maintain suppression pool water chemistry following a LOCA. The SLCS accomplishes this purpose by injecting sodium pentaborate into the reactor vessel to absorb thermal neutrons. The neutron absorber is dispersed within the reactor core in sufficient quantity to provide a reasonable margin for dilution, leakage, and imperfect mixing. The SLCS is not provided as a backup for reactor trip functions, since most transient conditions that require reactor trip occur too rapidly to be controlled by the SLCS. SLCS operation is initiated automatically by signals from the Redundant Reactivity Control System or can be initiated manually.

The SLCS also injects sodium pentaborate solution into the reactor vessel to maintain the suppression pool water inventory at a pH of 7.0 or higher following a design basis large break loss of coolant accident.

The SLCS 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 LGS UFSAR section 9.3.5.

Boundary

The SLCS license renewal scoping boundary begins with the SLCS storage tank and includes the three positive displacement pumps, three pump discharge relief valves, three pulsation dampeners/accumulators, three explosively actuated valves and piping to the primary containment isolation valves. Also included in the SLCS boundary are the SLCS tank electric heaters, heat tracing and SLCS test tank. All associated piping, components and instrumentation contained within the boundary described above are included in the SLCS boundary.

The two parallel motor operated stop-check primary containment isolation valves and piping inside the primary containment are evaluated as part of the Reactor Coolant Pressure Boundary System for license renewal.

Included in the license renewal boundary of SLCS 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 the point no longer in proximity to equipment performing a safety-related function, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Enclosure. Also included in the boundary are pressure-retaining components located in the Reactor Enclosure relied upon to preserve the leakage boundary intended function of the system.

For more information, refer to the License Renewal Boundary Drawings for identification of the boundary.

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 Environmental Qualification (10 CFR 50.49) and 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), and Station Blackout (10 CFR 50.63).

Intended Functions

1. Introduce emergency negative reactivity to make the reactor subcritical. The SLCS 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. The SLCS is designed to be manually initiated from the control room to pump sodium pentaborate into the reactor after a large break LOCA to maintain suppression pool pH at a level of 7.0 or higher to minimize iodine releases from primary containment. 10 CFR 54.4(a)(1)

3. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. The SLCS includes nonsafety-related fluid filled lines in the Reactor Enclosure which have spatial interaction 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 Environmental Qualification (10 CFR 50.49). Safety related SLCS electrical components are designed to accommodate the affects of and be compatible with the environmental conditions associated with normal operations, maintenance, testing, and postulated accidents, including LOCAs. 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 Transients Without Scram (10 CFR 50.62). The SLCS injects sodium pentaborate solution into the reactor to achieve shutdown for mitigation of an ATWS. 10 CFR 54.4(a)(3)

UFSAR References

3.2
3.9.3
3.11
7.1
7.4
7.5
9.3.5
15.6.5
15.8

License Renewal Boundary Drawings

LR-M-48, Sheet 1
LR-M-48, Sheet 2

Table 2.3.3-24 Standby Liquid Control System
Component Subject to Aging Management Review

Component Type	Intended Function
Accumulator (1A, 1B, 1C, 2B)	Pressure Boundary
Accumulator (2A, 2C)	Pressure Boundary
Bolting	Mechanical Closure
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Pump Casing	Pressure Boundary
Tanks	Leakage Boundary
	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

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

Table 3.3.2-24 Standby Liquid Control System
Summary of Aging Management Evaluation

2.3.3.25 Traversing Incore Probe System

Description

The Traversing Incore Probe (TIP) System is an electrical instrumentation system used 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.

The purpose of the TIP System is to measure local neutron flux at various locations throughout the core. The TIP System accomplishes its purpose by utilizing five neutron monitoring detectors and positioning systems capable of moving the detectors to various locations in the core corresponding to the locations of the LPRM detectors. The moveable TIP detectors, as with the fixed LPRM detectors, generate signals that are processed to indicate local power in the vicinity of each detector.

The TIP detectors are normally fully withdrawn from the core and stored outside of primary containment. The TIP system includes a purge system that maintains a supply of dry nitrogen to the TIP indexing mechanisms within containment that direct detector movement to various locations in the core. The TIP System includes mechanical components that maintain the primary containment boundary at the purge piping and TIP detector guide tubes. The TIP System does not generate any signals for protection of the reactor; however, the portions that maintain the primary containment boundary are in scope for license renewal. The TIP System does not have a function to maintain reactor coolant pressure boundary integrity since the dry tubes that provide the reactor coolant pressure boundary are located in the reactor vessel and are evaluated with the Reactor Vessel Internals. The majority of the TIP System is not in scope for license renewal.

The TIP System is comprised of the purge equipment subsystem and the drive mechanism subsystem. The purge equipment subsystem is comprised of the piping and valves from the Containment Atmospheric Control (CAC) System liquid nitrogen facility tanks to the purge control equipment, and piping and valves to the TIP indexing mechanisms inside primary containment. The purge equipment subsystem maintains a dry atmosphere within TIP System components to prevent corrosion of the TIP detector cabling and minimize the deterioration of the TIP guide tube lubricant. If the nitrogen supply from the CAC System is not available, the Primary Containment Instrument Gas System or an instrument air header from the Compressed Air System can supply purge air to the purge equipment subsystem. The TIP purge piping and isolation valves are common to all five TIP indexing mechanisms.

A separate air purge is provided to maintain a dry environment for the TIP drive mechanisms located outside primary containment. Dry air to this system is provided by an instrument air header from the Compressed Air System. If the Compressed Air System is unavailable, the Primary Containment Instrument Gas System can also supply purge air to the drive mechanisms. This purge system does not penetrate primary containment.

The drive mechanism subsystem is comprised of five trains, each consisting of a detector, attached to a drive and signal cable. Each detector has a drive mechanism consisting of a drive reel assembly capable of inserting and withdrawing the detector. Digital position indicators provide continuous indication of detector position and core top and core bottom position for the selected location. Each detector and drive mechanism has a chamber radiation shield that houses the detector when fully withdrawn from primary containment. TIP guide tubing provides a guide for the TIP detector throughout its travel from the chamber shield to the core top position inside the reactor vessel. An indexing mechanism associated with each detector allows the selection of any of the available 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 for biasing. The drive control unit provides control of detector insertion and retraction, provides display of detector position and monitoring the TIP detector location throughout its operation via status lights.

Each of the five drive mechanism trains includes an explosive-actuated shear valve and a ball valve located outside primary containment. 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 chamber shield. 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. 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.

For more detailed information, see UFSAR Sections 6.2.4.3.1.3.2.5 and 7.1.2.1.4.5.

Boundary

The TIP System boundary begins at the branch piping connections from the Compressed Air System, CAC Liquid Nitrogen Facility and Primary Containment Instrument Gas System, starting at the manual shutoff valve from each system. The TIP drive mechanism boundary continues from the Compressed Air System connection to the TIP drive mechanisms. The boundary includes the drive mechanism, chamber shields, shear valves, ball valves, and to the primary containment penetrations. Inside primary containment, the branch piping continues through the TIP guide tubes, indexing mechanisms, from which multiple TIP guide tubes proceed to the reactor vessel and ends at the core top position inside the 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 TIP purge subsystem boundary continues from the branch piping connections from the CAC System liquid nitrogen facility and Primary Containment Instrument Gas System to the TIP purge equipment station outboard isolation valve, and to the primary containment penetration. Inside primary containment, the branch piping continues through an inboard isolation valve, branches to five purge control valves and ends at the indexing mechanisms. All associated safety-related piping, components and instrumentation contained within the flow paths described above are included in the system boundary.

There are two portions of the TIP System boundary that are in scope for license renewal for the primary containment boundary intended function. These portions of the system are within the drive mechanism subsystem and the purge equipment subsystem. The in scope boundary within the drive mechanism subsystem includes the TIP guide tubing from the explosive-actuated shear valve assembly on each of the five TIP System trains, to the downstream ball valves, test valves and piping associated with each train, to the primary containment penetration. For the purge equipment subsystem, the in scope boundary includes the outboard isolation valve and downstream piping to the inboard isolation check valve inside primary containment. Also included in the license renewal scoping boundary of the TIP System 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. Included in this boundary are components relied upon to preserve the structural support intended function of this portion of the system. All other nonsafety-related portions of the TIP System are not in scope for license renewal since they are not required to support the intended function of providing primary containment boundary. For more information, refer to the license renewal boundary drawing for identification of this boundary, shown in red.

Not included in the system boundary of the TIP System are the dry tubes inside the reactor vessel, which are included in the Reactor Vessel Internals scoping boundary. Also not included in the system boundary are the TIP guide tube primary containment penetrations, which are separately evaluated for license renewal scoping in the Primary Containment Structure.

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 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 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. TIP System lines penetrating primary containment are provided with 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 safety-related to nonsafety-related interface has components relied upon to preserve the structural support intended function. 10 CFR 54.4(a)(2)

UFSAR References

Table 3.2-1
6.2.4.3.1.3.2.5
7.1.2.1.4.5
7.7.1.6.3

License Renewal Boundary Drawings

LR-M-59, Sheet 1
LR-M-59, Sheet 3

Table 2.3.3-25 Traversing Incore Probe System
Component Subject to Aging Management Review

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

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

2.3.3.26 Water Treatment and Distribution System

Description

The Water Treatment and Distribution (WTD) System is a normally operating system and consists of the Clarified Water subsystem and the Demineralized Water Makeup subsystem and is designed to provide treated makeup water to support normal plant operation. The WTD also includes the Domestic Water subsystem. The system has no safety-related functions.

The purpose of the Clarified Water and Demineralized Water Makeup subsystems is to provide filtered, clarified water for use as lubricating water to the lube water pumps and provide a supply of treated water suitable as makeup for the plant and reactor systems and for other demineralized water requirements.

The WTD System is supplied with water from the Perkiomen Creek or Schuylkill River. This water is clarified and used as lubricating water for the lube water pumps. The clarified water is also used as the source for a portable water treatment system that provides demineralized water for various plant applications.

The purpose of the Domestic Water subsystem is to provide water for use in various plant kitchens, rest rooms, showers and emergency eyewash stations. It accomplishes this by providing chlorinated water from an on-site well to the various users.

The WTD System does not contain any safety-related components or environmentally qualified components.

Portions of the WTD System are located in the Reactor Enclosure, Emergency Diesel Generator Enclosure, and Control Enclosure. The intended function of these portions of the WTD System is to resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of the safety-related function of the safety-related SSC located in these structures. Portions of the WTD System are also located in the Turbine Enclosures. Only those portions of the system that are located within the condenser compartment in the Turbine Enclosure have an intended function to resist nonsafety-related failure of safety-related SSC.

For more detailed information see UFSAR Sections 9.2.4 and 9.2.5.

Boundary

The license renewal scoping boundary of the WTD System encompasses the liquid-filled portion of the system that is located in proximity to equipment performing a safety-related function. This includes the liquid-filled portions of the system located within the Reactor Enclosure, Emergency Diesel Generator Enclosure, Control Enclosure and the Turbine Enclosure. 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 Drawings for identification of this boundary, shown in red.

Not included in the scope of license renewal is the portion of the WTD System located outside of the main condenser compartment in the Turbine Enclosure and the portions of the WTD System that are located within the Radwaste Enclosure, Auxiliary Boiler and Lube Oil Storage Enclosure, Circulating Water Pump House, Chemistry Lab, Water Treatment Building, Office and Administrative Facilities, Security Structures, and Yard Facilities.

Reason for Scope Determination

The Water Treatment and Distribution 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 Water Treatment and Distribution 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 Water Treatment and Distribution 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 WTD System contains nonsafety-related piping and components in the Reactor Enclosure, Emergency Diesel Generator Enclosure, Turbine Enclosure, and Control Enclosure which have potential spatial and structural interactions with safety-related SSCs. 10 CFR 54.4(a)(2)

UFSAR References

9.2.4
9.2.5

License Renewal Boundary Drawings

LR-M-17, Sheet 2
LR-M-18, Sheet 2
LR-M-18, Sheet 3
LR-M-02, Sheet 1
LR-M-02, Sheet 3
LR-M-13, Sheet 1
LR-M-13, Sheet 2
LR-M-20, Sheet 4
LR-M-20, Sheet 10
LR-M-30, sheet 1
LR-M-48, Sheet 1
LR-M-48, sheet 2
LR-M-51, sheet 2
LR-M-51, sheet 4
LR-M-51, Sheet 6
LR-M-51, Sheet 8
LR-M-53, Sheet 1
LR-M-53, Sheet 2
LR-M-53, Sheet 4
LR-M-78, Sheet 1
LR-M-78, Sheet 2

LR-M-87, Sheet 1
LR-M-87, Sheet 6
LR-M-90, Sheet 1

Table 2.3.3-26 Water Treatment and Distribution System
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Piping, piping components, and piping elements	Leakage Boundary
Pump Casing	Leakage Boundary
Tanks	Leakage Boundary
Valve Body	Leakage Boundary

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

Table 3.3.2-26 Water Treatment and Distribution System
Summary of Aging Management Evaluation

2.3.4 STEAM AND POWER CONVERSION SYSTEMS

The following systems are addressed in this section:

- Circulating Water System (2.3.4.1)
- Condensate System (2.3.4.2)
- Condenser and Air Removal System (2.3.4.3)
- Extraction Steam System (2.3.4.4)
- Feedwater System (2.3.4.5)
- Main Steam System (2.3.4.6)
- Main Turbine (2.3.4.7)

2.3.4.1 Circulating Water System

Description

The Circulating Water System is a closed-loop system consisting of hyperbolic natural draft cooling towers, four 25 percent capacity circulating water pumps per unit, and associated piping, valves, controls, and instrumentation designed to remove the design plant heat loads. The license renewal Circulating Water System includes the plant Chlorination System, and the Schuylkill River and Perkiomen Creek Makeup Systems. The intended function of the Circulating Water System for license renewal is to maintain pressure boundary integrity in that portion of the system that provides a water source for the Fire Protection System, and to resist nonsafety-related failure by maintaining leakage boundary integrity to preclude system interactions with safety-related components. For this reason, the portions of this system that provide a flowpath to the Fire Protection System pumps, and that contain pressure retaining components located in proximity to other components performing safety-related functions are included in the scope of license renewal. The Circulating Water System is not safety-related, and is not required to operate to support license renewal intended functions, however portions of the system are in scope for pressure boundary and potential spatial interaction.

Circulating water from the cooling tower basin flows by gravity through the condensers to the suction of the circulating water pumps, which return the water to the cooling tower. The low pressure (LP) condenser is supplied by two 96-inch lines. One of these lines also provides a water source to the suction of the main Fire Protection System pumps. Each 96-inch line branches into two 78-inch lines before being connected to the condenser water boxes. The circulating water discharging from the LP condenser flows into the Intermediate Pressure (IP) condenser and subsequently to the high pressure (HP) condenser in series. From the discharge of the HP condenser, each pair of 78-inch lines is combined into one of two 96-inch headers, with each header feeding two electric motor-driven circulating water pumps, located in the Circulating Water Pump House. The pump discharge headers are run underground back to the cooling tower.

Motor-operated butterfly valves are provided in each of the 78-inch circulating water lines, one at the inlet to the LP condenser and another at the outlet of the HP condenser. These valves permit any of the four flow paths on the circulating water side (tube-side) of the condensers to be isolated if there is tube leakage. A major rupture of the Circulating Water System would have no effect on any safety-related system.

The circulating water is chlorinated to prevent the formation of biological growth. Chemical treatment is used to control pH and prevent scaling on the condenser tubes. Cooling tower chemical treatment is used to control steel and copper corrosion, heat exchanger scaling, deposition, and foaming.

Makeup is provided to the Circulating Water System to replace water lost due to evaporation and drift in the cooling towers, and blowdown from the system which controls buildup of dissolved solids. Makeup water is provided from the Schuylkill River and the Perkiomen Creek. The makeup flow to the cooling towers is controlled by motor-operated flow control valves on the supply lines. The Schuylkill River makeup supply consists of five pumps and associated equipment. The Perkiomen Creek makeup supply consists of three pumps and associated equipment, which discharge through a 7.6-mile pipeline to a storage tank at the LGS plant site. Makeup supply is provided in accordance with criteria established by the Delaware River Basin Commission. The makeup supply systems do not perform an intended function and are not in scope for license renewal.

For more detailed information, see UFSAR section 10.4.5.

Boundary

The Circulating Water System license renewal scoping boundary includes the piping that supplies water to the common Fire Protection System main pumps. This is the 96-inch piping line from each cooling tower basin that supplies the “B” and “D” circulating water loops to the condenser. It begins at each cooling tower basin and continues through the 96-inch circulating water piping line to the interface with the 14-inch fire water suction line. It includes the debris screens in the cooling tower basin. To maintain the pressure boundary for the fire protection water supply function, the boundary continues to the point where 96-inch line branches into two 78-inch lines and ends at the isolation valves on each of those lines at the condenser inlet.

Also included in the license renewal scoping boundary of the Circulating Water System are those water filled portions of nonsafety-related piping and equipment located in proximity to equipment performing a safety-related function. This includes the nonsafety-related portions of the system located within the Turbine Enclosure. 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 Circulating Water System license renewal scoping boundary is the balance of the system not described above, including the chemical treatment system, water box scavenging equipment, and makeup systems, as these portions of the Circulating Water System do not perform an (a)(1), (a)(2) functional, or (a)(3) intended function, and are not located in proximity to equipment performing a safety-related function such that spatial interaction could occur.

Reason for Scope Determination

The Circulating Water 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 Circulating 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 Circulating 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 Circulating 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 Circulating Water System contains nonsafety-related fluid filled lines within the Turbine Enclosure which have the potential for spatial interaction 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). Circulating Water System piping from the cooling tower basins provides a suction source to the main Fire Protection System pumps. 10 CFR 54.4(a)(3)

UFSAR References

10.4.5

License Renewal Boundary Drawings

LR-M-09, Sheet 1
LR-M-09, Sheet 3
LR-M-09, Sheet 6
LR-M-09, Sheet 8

Table 2.3.4-1 <u>Circulating Water System</u>
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Expansion Joints	Leakage Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Strainer (Element)	Filter
Valve Body	Leakage Boundary
	Pressure Boundary

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

Table 3.4.2-1 Circulating Water System
Summary of Aging Management Evaluation

2.3.4.2 Condensate System

Description

The Condensate System is a normally operating mechanical 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 condensate water for use in normal plant operations and refueling operations. The Condensate System consists of the following plant systems: Condensate (up to the filter demineralizers), Condensate Filter Demineralizers, and Condensate and Refueling Water Storage and Transfer. 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.

Condensate and Condensate Filter Demineralizers system

The purpose of the Condensate and Condensate Filter Demineralizers systems is to provide filtered and demineralized condensate from the condenser hotwell to the Feedwater System. The Condensate and Condensate Filter Demineralizers systems accomplish this by using three condensate pumps to pump deaerated condensate from the main condenser hotwells through the steam jet air ejector condenser, the gland steam packing exhauster condenser, and then through the condensate cleanup system. The condensate cleanup system utilizes filters and demineralizers to maintain the condensate at the required purity by removing corrosion products, suspended and dissolved solids, and fission and activation products.

Condensate and Refueling Water Storage and Transfer system

The purpose of the Condensate and Refueling Water Storage and Transfer system is to provide for the storage of condensate water for use in normal plant operations and refueling operations. The Condensate and Refueling Water Storage and Transfer system accomplishes this by using condensate transfer, condensate jockey, and refueling water pumps to provide water from the storage tanks to various services in the plant. The Refueling Water Storage Tank stores the water that is used to fill the reactor well, the dryer and separator storage pool, and the spent fuel cask storage pit of both units. The Condensate Storage Tanks supply condensate for various processes in the radwaste system and makeup for the plant systems, including the main condenser hotwells.

The Condensate Storage Tanks supply water to the Core Spray System for testing and are the preferred source of water for the HPCI and RCIC pumps for both operational use and testing since they provide better quality water than the suppression pool. However, the Condensate Storage Tanks are not the credited water supply for the HPCI and RCIC systems for accident or transient mitigation, Fire Safe Shutdown, or Station Blackout coping. The suppression pool is the credited water source for HPCI and RCIC for these events.

During normal plant operating conditions the Condensate System is used through different connections to keep the ECCS lines full. However, the Condensate System is not the credited water source. The Safeguard Piping Fill system (evaluated with the Core Spray System) is credited and uses the suppression pool as the credited water source.

The Condensate System includes piping and components located in the Reactor Enclosure that supply condensate from the Condensate Storage Tanks to the HPCI , RCIC, Core Spray, and Residual Heat Removal Systems. The piping to the HPCI, RCIC, and Core Spray Systems is safety-related and includes level transmitters which automatically realign the suction source for the HPCI and RCIC Systems from the Condensate Storage Tanks to the suppression pool on low Condensate Storage Tank level. Should the nonsafety-related portion of the piping from the Condensate Storage Tank located outside of the Reactor Enclosure break, the safety-related portion within the Reactor Enclosure from grade level down to the HPCI and RCIC pump compartments remains full to ensure that the level transmitters are capable of initiating the automatic realignment of the pump suction to the suppression pool.

The Condensate System includes nonsafety-related remote manual motor operated isolation valves in the nonsafety-related portion of the piping that supplies condensate from the Condensate Storage Tanks to the HPCI and RCIC Systems. The HPCI and RCIC Systems are credited for Fire Safe Shutdown and their suctions are normally aligned to the Condensate Storage Tank. The valves in the piping from the Condensate Storage Tank are in scope for Fire Safe Shutdown since spurious closure of these valves during a postulated fire would result in loss of HPCI and RCIC suction requiring manual realignment of the HPCI and RCIC suction to the suppression pool.

For more detailed information see UFSAR Sections 1.2.4.7, 7.3.1, 9.2.7, 10.4.6, 10.4.7, and Appendix 9A.

Boundary

The safety-related portion of the Condensate System license renewal scoping boundary includes the section of piping located in the Reactor Enclosure that supplies condensate from the Condensate Storage Tanks to the HPCI, RCIC, and Core Spray systems. The scoping boundary begins where the piping enters the Reactor Enclosure and continues up to the suction piping of the HPCI, RCIC, and Core Spray System pumps. Included in this boundary are the safety-related level transmitters located in the condensate supply to the HPCI and RCIC pumps.

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

The portion of the Condensate System license renewal scoping boundary credited for Fire Safe Shutdown includes the nonsafety-related motor operated isolation valves in the nonsafety-related portion of the piping that supplies condensate from the Condensate Storage Tanks to the HPCI, RCIC, and Core Spray Systems. These valves are located in the yard area.

Also included in the license renewal scoping boundary of the Condensate System 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 no longer in proximity to equipment performing a safety-related function, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Enclosure and Auxiliary Boiler and Lube Oil Storage Enclosure. 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.

Also included in the license renewal scoping boundary of the Condensate System are those water filled portions of nonsafety-related piping and equipment located in proximity to equipment performing a safety-related function. This includes the nonsafety-related portions of the Condensate System located within the Reactor Enclosure, Control Enclosure, Auxiliary Boiler and Lube Oil Storage Enclosure, and Turbine Enclosure. 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. Sense process conditions and generate signals for reactor trip or engineered safety features actuation. The Condensate System includes safety-related piping and level transmitters which function to automatically realign the suction source for the HPCI and RCIC Systems from the preferred source (Condensate Storage Tanks) to the credited source (suppression pool). 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 Reactor Enclosure, Control Enclosure, Auxiliary Boiler and Lube Oil Storage Enclosure, and Turbine Enclosure 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 Condensate System includes motor operated Condensate Storage Tank isolation valves which are credited for Fire Safe Shutdown. 10 CFR 54.4(a)(3)

UFSAR References

1.2.4.7.9
1.2.4.7.10
5.4.6
6.2.3.2.3
6.3.2.2.1
6.3.2.2.6
9.2.7
10.4.6

10.4.7

License Renewal Boundary Drawings

LR-M-05, Sheet 1
LR-M-05, Sheet 2
LR-M-05, Sheet 3
LR-M-05, Sheet 4
LR-M-08, Sheet 2
LR-M-08, Sheet 3
LR-M-16, Sheet 1
LR-M-45, Sheet 1
LR-M-45, Sheet 2
LR-M-49, Sheet 1
LR-M-49, Sheet 2
LR-M-51, Sheet 1
LR-M-51, Sheet 5
LR-M-52, Sheet 1
LR-M-52, Sheet 2
LR-M-52, Sheet 3
LR-M-52, Sheet 4
LR-M-53, Sheet 1
LR-M-53, Sheet 2
LR-M-53, Sheet 4
LR-M-55, Sheet 1
LR-M-55, Sheet 2
LR-M-64, Sheet 1
LR-M-66, Sheet 1
LR-M-67, Sheet 1

Table 2.3.4-2 Condensate System
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Expansion Joints	Leakage Boundary
Flow Device	Leakage Boundary
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 3.4.2-2 Condensate System
Summary of Aging Management Evaluation

2.3.4.3 Condenser and Air Removal System

Description

The Condenser and Air Removal (CAR) System is a normally operating system designed to condense and deaerate the exhaust steam from the main turbine during normal operation. The system has a function to provide passive hold-up for leakage from the main steam isolation valves following an accident and isolate mechanical vacuum pump discharge upon detection of high radiation in the main steam lines. 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.

The purpose of the CAR System is to condense and deaerate the exhaust steam from main and reactor feed pump turbines, provide a heat sink for heat cycle drains and discharges, provide a passive holdup volume following an accident for any leakage through the MSIVs and isolate the MVP during its use when high main steam line radiation is detected. The system accomplishes these functions by passing circulating water through the condenser tubes, removing non-condensable gases during normal operation and plant startup, and providing a volume for holdup and surfaces for plateout of radioactive material resulting from MSIV leakage. During periods when the mechanical vacuum pump is in service, operation of the MVP is terminated upon detection of high radiation levels in the main steam piping.

The Condenser and Air Removal System does not include any safety-related or environmentally qualified components.

The condenser and a main steam line drain support a safety function to minimize doses following a design basis LOCA by providing a flowpath to the condenser for MSIV leakage and a passive volume for plateout and decay of the MSIV leakage. This feature is part of the MSIV alternate drain pathway.

The isolation of the MVP discharge also performs a safety function to minimize the release of radioactivity from a Control Rod Drop Accident if such an accident were to occur while the MVP was in operation.

Portions of the Condenser and Air Removal system are located in the vicinity of safety-related main steam piping and components in the Turbine Enclosures. The intended function of these portions of the Condensate and Air Removal 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 6.7, 10.4, 7.6, 15.4 and 15.6.

Boundary

The license renewal scoping boundary of the CAR System encompasses the liquid-filled portion of the system that is located in proximity to equipment performing a safety-related function. This includes the liquid filled portions of the system located within the Turbine Enclosure. 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 Drawings for identification of this boundary, shown in red.

The license renewal scoping boundary of the CAR System encompasses those components that perform a safety function as part of the MSIV alternate drain pathway. This includes the alternate drain pathway from the Main Steam System and the main condenser. The alternate drain pathway from the main steam lines consists of piping discharging into the high pressure condenser. The alternate drain pathway piping is included in the Main Steam System for license renewal. For more information, refer to the License Renewal Boundary Drawings for identification of these components, shown in green.

With the exception of the alternate drain pathway piping, piping attached to the main condenser is included in scope for spatial interaction only. No credit is taken for plateout or holdup in the piping attached to the main condenser and the piping is not required to be leaktight following any design basis accidents.

The license renewal scoping boundary of the CAR System encompasses those components that perform a safety function to minimize releases from a Control Rod Drop Accident (CRDA) during MVP operation. This only includes the MVP inlet valve that is required to close to isolate the pathway to the environment. Not included in the scoping boundary of the CAR System are the main steam line radiation monitors. These are evaluated with the Process Radiation Monitoring System.

Reason for Scope Determination

The Condenser and Air Removal 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 Condenser and Air 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 Condenser and Air Removal 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 CAR System contains nonsafety-related piping and components in the Turbine Enclosure which have potential spatial interaction with safety-related SSC. 10 CFR 54.4(a)(2)

2. Post accident containment holdup and plateout of MSIV bypass leakage. Credit is taken for the main steam line alternate drain pathway to transport MSIV seat leakage to the main condenser. Credit is taken for plateout and holdup in the main condenser for MSIV seat leakage. 10 CFR 54.4(a)(2)

3. Resist nonsafety-related failure that could prevent satisfactory accomplishment of a safety-related function. The CAR System is relied upon in safety analyses to terminate releases from the Mechanical Vacuum Pump upon detection of high main steam line radioactivity. 10 CFR 54.4(a)(2)

UFSAR References

10.4.1
10.4.2
6.7
7.6
15.4.9
15.6.5

License Renewal Boundary Drawings

LR-M-01, Sheet 1
LR-M-01, Sheet 2
LR-M-01, Sheet 3
LR-M-01, Sheet 4
LR-M-02, Sheet 1
LR-M-02, Sheet 3
LR-M-03, Sheet 1
LR-M-03, Sheet 2
LR-M-04, Sheet 1
LR-M-04, Sheet 2
LR-M-04, Sheet 3
LR-M-04, Sheet 4
LR-M-04, Sheet 5
LR-M-04, Sheet 6
LR-M-05, Sheet 1
LR-M-05, Sheet 2
LR-M-05, Sheet 3
LR-M-05, Sheet 4
LR-M-06, Sheet 1
LR-M-06, Sheet 4
LR-M-07, Sheet 1
LR-M-07, Sheet 3
LR-M-09, Sheet 1
LR-M-09, Sheet 6

Table 2.3.4-3 Condenser and Air Removal System
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Flow Device	Leakage Boundary
Heat Exchanger Components	Containment, Holdup and Plateout
	Leakage Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
Tanks	Leakage Boundary
Valve Body	Leakage Boundary

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

Table 3.4.2-3 Condenser and Air Removal System
Summary of Aging Management Evaluation

2.3.4.4 Extraction Steam System

Description

The Extraction Steam System supplies steam from the high pressure turbine, cross-around piping, moisture separator drains, and low pressure turbine stages to the six stages of feedwater heaters. The Extraction Steam System is in scope for license renewal. However, portions of the Extraction Steam System are not required to perform intended functions and are not in scope.

The purpose of the Extraction Steam System is to provide a flowpath for steam and condensate to pre-heat feedwater. The steam supplied to the feedwater heaters is used to heat the condensate as it passes through the feedwater heaters back to the reactor vessel. The Extraction Steam System accomplishes this purpose by directing the flow of steam and condensate from selected locations in the main steam flow path to the feedwater heaters.

The extraction steam is condensed in each heater, and the condensed steam is drained to the next lowest pressure heater. The moisture removed from the steam by the moisture separators is drained to the fourth stage heater, where it mixes with the condensed extraction steam and is eventually drained back to the main condenser. The extraction steam piping includes drains and associated drain valve controls to route condensate in the extraction piping to the main condenser during unit startup and turbine trips. The extraction steam piping includes valves and associated controls to prevent water induction into the main turbine from high water level in the feedwater heater shells. In order to prevent turbine overspeed caused by backflow of steam from extraction lines to the turbine, following a turbine trip, the third, fourth and sixth stage feedwater heaters have air-operated bleeder trip valves which close upon a turbine trip. The extraction steam lines to the second stage heaters are provided with spring assisted check valves.

Portions of the Extraction Steam System are located in the vicinity of safety-related main steam piping and components. The intended function of these portions of the Extraction Steam System is to resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of the safety-related function of the Main Steam System.

For more detailed information see UFSAR sections 10.1 and 10.2.

Boundary

The license renewal scoping boundary of the Extraction Steam System encompasses the liquid and steam filled portion of the system that is located in proximity to equipment performing a safety-related function. This includes the liquid and steam filled portions of the Extraction Steam System in the Turbine Enclosure outside the main condenser shell but does not include the extraction steam piping within the feedwater heater compartments. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of the Extraction Steam System.

The Extraction Steam System boundary with the Main Turbine high pressure turbine is at the turbine casing nozzles (stage 7) for the extraction steam and extraction stage drain piping.

The Extraction Steam System boundary with the Main Turbine main steam cross-around piping is at the piping tee on the cross-around piping between the high pressure turbine exhaust and the moisture separator inlet.

The Extraction Steam System boundary with the Main Turbine moisture separators is at the moisture separator drains outlet check valve to each of the number four feedwater heaters.

The Extraction Steam System boundary with the Main Turbine low pressure turbines is at the turbine casing nozzles (stages 13, 15, 17, and 19) for the extraction steam piping.

The Extraction Steam System boundary with the Feedwater System feedwater heaters is at the heater shell nozzle for each feedwater heater.

Drains are provided in the extraction steam piping for removal of condensate to the main condenser. The Extraction Steam System boundary with the Condenser and Air Removal System is at the condenser nozzle for each drain line.

Reason for Scope Determination

The Extraction Steam 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 Extraction 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 Extraction Steam 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 Extraction Steam System contains nonsafety-related high energy lines in the Turbine Enclosure which have potential spatial interactions with safety-related SSCs. 10 CFR 54.4(a)(2)

UFSAR References

10.1
10.2

License Renewal Boundary Drawings

LR-M-01, sheet 1
LR-M-01, sheet 2
LR-M-01, sheet 3
LR-M-01, sheet 4
LR-M-02, sheet 1
LR-M-02, sheet 2
LR-M-02, sheet 3
LR-M-02, sheet 4

Table 2.3.4-4 Extraction Steam System
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Expansion Joints	Leakage Boundary
Flow Device	Leakage Boundary
Piping, piping components, and piping elements	Leakage Boundary
Valve Body	Leakage Boundary

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

Table 3.4.2-4 Extraction Steam System
Summary of Aging Management Evaluation

2.3.4.5 Feedwater System

Description

The Feedwater System is a normally operating mechanical system designed to provide preheated feedwater to the reactor pressure vessel. The Feedwater System consists of the following plant systems: Heater Vents and Drains, Feedwater, 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.

Heater Vents and Drains

The purpose of the Heater Vents and Drains system is to preheat the feedwater prior to it entering the reactor pressure vessel to increase the heat cycle efficiency. The Heater Vents and Drains system accomplishes this by using low pressure feedwater heaters and extraction steam flow and moisture separator drain flow to preheat high quality condensate from the Condensate System deep bed demineralizers which is then discharged into a common reactor feed pump suction header. High pressure heaters on the reactor feed pump discharge provide further preheating prior to injection into the reactor pressure vessel.

Feedwater system

The purpose of the Feedwater system is to provide the reactor pressure vessel with a supply of high quality, pressurized, preheated feedwater. The Feedwater system accomplishes this by taking high quality, preheated feedwater from the Heater Vents and Drains system and injecting the feedwater into the reactor pressure vessel using turbine driven reactor feed pumps.

The Feedwater system includes a Feedwater Zinc Injection subsystem. The purpose of the Feedwater Zinc Injection subsystem is to reduce the levels of corrosion products and cobalt deposits in the primary piping and components in order to reduce radioactive contamination buildup and dose levels. The Feedwater Zinc Injection subsystem accomplishes this by injecting soluble zinc oxide into the suction side of the reactor feed pumps using a Zinc Injection Passivation (GEZIP) skid.

The Feedwater system includes safety-related and environmentally qualified primary containment isolation valves (PCIVs). The Feedwater system is credited for Station Blackout coping and Fire Safe Shutdown as the injection flowpath into the reactor pressure vessel for the Reactor Core Isolation Cooling (RCIC) and High Pressure Coolant Injection (HPCI) systems. The Feedwater system also includes high to low pressure interface valves which are credited for Fire Safe Shutdown.

The Feedwater system includes a runback function designed to mitigate the consequences of an ATWS event by limiting feedwater flow into the vessel. Actuation logic for the runback function is provided by the Redundant Reactivity Control System (RRCS).

Hydrogen Water Chemistry system

The purpose of the Hydrogen Water Chemistry system is to mitigate the chemical conditions in the recirculation water that allow intergranular stress corrosion cracking (IGSCC). The

Hydrogen Water Chemistry system accomplishes this through the addition of hydrogen to the reactor feedwater to reduce the oxidizing chemistry conditions which promote IGSCC in reactor coolant pressure boundary piping and components, the reactor pressure vessel, and reactor vessel internals.

For more detailed information see UFSAR Sections 3.11, 6.2, 5.2.3.2.2, 5.4.6.1.1.2, 6.3.1.2.1, 7.6.1.8.3.3, 10.4.7, 10.4.11, 15.8.3, and Appendix 9A.

Boundary

The Feedwater System license renewal scoping boundary includes those portions of the system necessary to achieve primary containment isolation and maintain system pressure boundary for the injection of RCIC and HPCI. The Feedwater System primary containment penetrations are provided with a series arrangement of three isolation valves. The scoping boundary begins with the outer feedwater inlet outboard PCIV check valves and continues up to, but does not include, the inner outboard containment isolation valves located at the containment wall. The inner outboard containment isolation valves are evaluated with the Reactor Coolant Pressure Boundary license renewal system. Included in this boundary are the feedwater bypass and startup flushing lines and their associated PCIVs and shutoff valves, which are credited as high to low pressure interfaces for FSSD.

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 license renewal scoping boundary of the Feedwater System 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 no longer in proximity to equipment performing a safety-related function, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Enclosure and Turbine Enclosure. 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.

Also included in the license renewal scoping boundary of the Feedwater System are those water filled portions of nonsafety-related piping and equipment located in proximity to equipment performing a safety-related function. This includes the nonsafety-related portions of the Feedwater System located within the Turbine Enclosure. 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 Feedwater System scoping boundary are the Class 1 reactor coolant pressure boundary and containment isolation piping and components in the discharge portion of the system. These reactor coolant pressure boundary and containment isolation piping and components are evaluated as part of the Reactor Coolant Pressure Boundary license renewal system.

Not included in the Feedwater System scoping boundary is the Reactor Feed Pump Turbine Lube Oil system. This is evaluated with the Turbine Lube Oil subsystem of the Main Turbine license renewal system.

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 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 Feedwater System includes safety-related primary containment isolation valves in the feedwater inlet lines. 10 CFR 54.4(a)(1)

2. Remove residual heat from the reactor coolant system. The Feedwater System piping is used as the injection flowpath into the RPV for RCIC and HPCI. 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 Enclosure and Turbine Enclosure 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 Fire Protection (10 CFR 50.48). The Feedwater System piping is credited for Fire Safe Shutdown as the injection flowpath into the RPV for RCIC and HPCI. The Feedwater System also includes high to low pressure interface valves which are 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 Feedwater System primary containment isolation valves include 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 Anticipated Transients Without Scram (10 CFR 50.62). The Feedwater System runback function mitigates the consequences of an ATWS event by limiting feedwater flow into the vessel. 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 Feedwater System piping is credited for Station Blackout coping as the injection flowpath into the RPV for RCIC and HPCI. 10 CFR 54.4(a)(3)

UFSAR References

3.2
3.6

3.11
6.2
5.2.3.2.2
5.4.6.1.1.2
6.3.1.2.1
7.1.2.1.9
7.6.1.8.3.3
7.7.1.4
7.7.2.4
10.4.7
10.4.11
15
Appendix 9A

License Renewal Boundary Drawings

LR-M-02, Sheet 1
LR-M-02, Sheet 3
LR-M-03, Sheet 1
LR-M-03, Sheet 2
LR-M-04, Sheet 1
LR-M-04, Sheet 2
LR-M-04, Sheet 3
LR-M-04, Sheet 4
LR-M-04, Sheet 5
LR-M-04, Sheet 6
LR-M-05, Sheet 1
LR-M-05, Sheet 2
LR-M-05, Sheet 3
LR-M-05, Sheet 4
LR-M-06, Sheet 1
LR-M-06, Sheet 2
LR-M-06, Sheet 3
LR-M-06, Sheet 4
LR-M-06, Sheet 5
LR-M-06, Sheet 6
LR-M-23, Sheet 4
LR-M-23, Sheet 7
LR-M-41, Sheet 1
LR-M-41, Sheet 4

Table 2.3.4-5 Feedwater System
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Expansion Joints	Leakage Boundary
Flow Device	Leakage Boundary
Heat Exchanger Components (Drain Cooler Shell and Tube Side Components)	Leakage Boundary
Heat Exchanger Components (Feedwater Heater Shell and Tube Side Components)	Leakage Boundary
Piping, piping components, and piping elements	Leakage Boundary
	Pressure Boundary
	Structural Support
Valve Body	Leakage Boundary
	Pressure Boundary

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

Table 3.4.2-5 Feedwater System
Summary of Aging Management Evaluation

2.3.4.6 Main Steam System

Description

The Main Steam (MS) 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 MS System includes the MSIV alternate drain pathway and the MSIV Leakage Control system. The MS 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 main steam piping consists of four main steam lines from the reactor vessel to the high pressure turbine. Each of these main steam lines includes relief valves inside primary containment, an inboard primary containment isolation valve, an outboard containment isolation valve, a main turbine stop valve and main turbine control valve.

The purpose of the MS 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 and the main turbine stop valves and main turbine bypass valves.

The purpose of the MS System is to also provide the capability to bypass steam around the main turbine. It accomplishes this by operation of a series of nine main turbine bypass valves that discharge to the main condenser. The purpose of the MS System is to also provide steam to the reactor feed pump turbines, steam seal evaporator, air ejectors, gaseous radwaste recombiner preheater, and condenser hotwell steam spargers to support their normal operation. 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 MS System also includes the discharge piping from the main steam relief valves (MSRV) inside primary containment. The purpose of this portion of the MS system is to route the MSRV discharge to the suppression pool to minimize 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 pool water level, to a quencher to facilitate condensation of the steam.

The purpose of the MS System is also to contain main steam isolation valve leakage following a LOCA. It accomplishes this by providing a volume within the large diameter main steam piping for plateout and holdup and a flow path through the MSIV alternate drain pathway to the main condenser for additional plateout and holdup in the condenser. Portions of the MS System outside primary containment are safety-related and form part of the MSIV alternate drain pathway. Other portions of the MS System outside primary containment are not safety-related and also form part of the MSIV alternate drain pathway. The MSIV Leakage Collection system was originally installed to process MSIV leakage following a LOCA. However, this system is not longer required and has been abandoned in place.

Portions of the MS System are located in the vicinity of safety-related main steam piping components in the Reactor Enclosures and Turbine Enclosures. The intended function of these portions of the MS 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, 3.6, 5.2, 6.7, 10.1, 10.2, 10.4 and 15.6.

Boundary

The license renewal scoping boundary of the MS System includes the main steam lines from the outboard isolation valves up to and including the main turbine stop valves and main turbine bypass valves. However, the main steam isolation valves are not included and are evaluated with the Reactor Coolant Pressure Boundary for license renewal. The main turbine control valves and downstream piping are also not included in the scope of the MS System and are evaluated with the Main Turbine System for license renewal. The piping downstream of the main turbine bypass valves to the main condenser is evaluated with the Main Turbine System for license renewal.

The license renewal scoping boundary of the MS System also includes the branch piping from the main steam lines to the steam jet air ejectors, reactor feed pump turbines, steam seal evaporator, gaseous radwaste recombiner preheater, and condenser hotwell steam spargers as well as drains from these lines to the main condenser. Also included is the main steam relief valve (MSRV) discharge piping from the MSRV outlet connection to the steam quenchers located below the normal water level in the suppression pool.

The license renewal scoping boundary of the MS System includes the MSIV alternate drain pathway to the main condenser. This includes the drain lines from the main steam lines routed to the main condenser. Only a portion of the MSIV alternate drain pathway is safety-related.

The license renewal scoping boundary of the MS System also encompasses the liquid-filled portion of the system that is located in proximity to equipment performing a safety-related function. This includes the liquid-filled portions of the system located within the Reactor Enclosure and within the main condenser compartment in the Turbine Enclosure. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this system. This includes the branch piping from the main steam lines to the steam jet air ejectors, reactor feed pump turbines, steam seal evaporator, gaseous radwaste recombiner preheater, and condenser hotwell steam spargers as well as drains from these lines to the main condenser.

The MSIV Leakage Control system is part of the MS System. This system is abandoned in place, is drained, and has been physically disconnected from active and energized plant equipment. The function of this system is performed by the MSIV alternate drain pathway. This portion of the MS System does not perform any license renewal intended function and is therefore not in the scope of license renewal.

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. Provide emergency heat removal from primary containment and provide containment pressure control. The MSRV discharge quenchers condense the steam from MSRV operation to minimize pressure and thermal effects on the primary containment during plant events. 10 CFR 54.4(a)(1)

2. Post accident containment holdup and plateout of MSIV bypass leakage. The main steam lines are credited with holdup and plateout of MSIV leakage following a LOCA. Routing of the MSIV leakage through main steam line drains to the main condenser permits additional plateout and holdup in the main condenser. 10 CFR 54.4(a)(2)

3. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety-related function. Portions of the MS System are located in the Reactor Enclosure and within the main condenser compartment in the Turbine Enclosure in proximity to safety-related SSC. 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 MSRV discharge quenchers condense the steam from MSRV operation to minimize pressure and thermal effects on the primary containment during fire related events. 10 CFR 54.4(a)(3)

5. Relied upon in safety analyses of plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Environmental Qualification (10 CFR 50.49). The main steam large branch piping isolation valves are expected to operate in a harsh post LOCA environment. 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 MSRV discharge quenchers condense the steam from MSRV operation to minimize pressure and thermal effects on the primary containment during station blackout. 10 CFR 54.4(a)(3)

UFSAR References

3.2
3.6
5.1
5.2
6.7
10.1
10.3
10.4
15.6

License Renewal Boundary Drawings

LR-M-01, Sheet 1

LR-M-01, Sheet 3
LR-M-05, Sheet 1
LR-M-05, Sheet 3
LR-M-06, Sheet 1
LR-M-06, Sheet 2
LR-M-06, Sheet 4
LR-M-06, Sheet 5
LR-M-23, Sheet 4
LR-M-23, Sheet 7
LR-M-41, Sheet 2
LR-M-41, Sheet 5
LR-M-49, Sheet 1
LR-M-49, Sheet 2
LR-M-55, Sheet 1
LR-M-55, Sheet 2
LR-M-69, Sheet 1
LR-M-69, Sheet 3

Table 2.3.4-6 **Main Steam System**
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting	Mechanical Closure
Flow Device	Leakage Boundary
Heat Exchanger Components	Leakage Boundary
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 3.4.2-6 Main Steam System
Summary of Aging Management Evaluation

2.3.4.7 Main Turbine

Description

The Main Turbine (MT) is a normally operating system designed to convert the thermal energy in the steam supplied from the reactor into rotational mechanical energy. The MT consists of the following subsystems: Main Turbine, Seal Steam system, Turbine Lube Oil system, Electrohydraulic Control system, and Turbine Supervisory Instrumentation system. The MT 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 six vertical moisture separator vessels and piping from the main turbine control valves to the low pressure turbine inlet. The purpose of the main turbine is to convert the thermal energy in the reactor produced steam into rotational mechanical energy for use by the main generator in producing electricity, provide a passive holdup volume in conjunction with the main condenser following an accident for any leakage through the Main Steam Isolation Valves (MSIV), and provide support for the safety-related portion of the main steam piping. It accomplishes this by main steam passing through the turbine blade stages to turn the turbine shaft which is coupled directly to the generator shaft. The exhaust hoods for the low pressure turbines are mounted on the top of the main condenser and form a portion of the boundary for holdup of MSIV leakage.

Seal Steam system

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 turbine high and low pressure rotors, shaft seals for the reactor feed pump turbine rotors, and the 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 system

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 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.

Turbine 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 intercept valves, and bypass valves.

Turbine Supervisory Instrumentation (TSI)

The purpose of TSI is to provide process indication, control, and alarm functions. It accomplishes this by installed instrumentation to monitor process variables in the Main Turbine System.

Portions of the MT are located in the vicinity of safety-related main steam piping components in the Turbine Enclosures. The intended function of these portions of the MT is to resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of the safety-related functions of the safety-related SSC.

The MT does not include any safety-related or environmentally qualified components.

For more detailed information see UFSAR Sections 3.2, 6.7, 10.1, 10.2, 10.3, 10.4, and 15.6.

Boundary

The license renewal scoping boundary of the MT encompasses the liquid-filled portion of the system that is located in proximity to equipment performing a safety-related function. This includes the liquid-filled portions of the system located within the main condenser compartment in the Turbine Enclosure. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this system. This includes the main turbine control valves, steam piping from the main turbine control valves to the high pressure turbine, piping from the high pressure turbine to the low pressure turbines, moisture separators, turbine bypass valve discharge piping to the main condenser, system drain piping to the main condenser and condensate storage tank in the main condenser compartment, air removal and sealing steam piping in the main condenser compartment, turbine lube oil supply and return piping in the main condenser compartment, and EHC piping in the main condenser compartment. For more information, refer to the License Renewal Boundary Drawings for identification of this boundary, shown in red.

The license renewal scoping boundary of the MT encompasses those components that perform a safety function as part of the MSIV alternate drain pathway. 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.

Also included in the license renewal scoping boundary of the MT are those portions of nonsafety-related piping and equipment that extend beyond the safety-related Main Steam System to nonsafety-related Main Turbine interface up to the location of the first seismic anchor. This includes the main turbine control valves, steam leads to the high pressure turbine and the high pressure turbine casing.

Reason for Scope Determination

The Main Turbine 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 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 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 MT contains nonsafety-related piping and components in the Turbine Enclosure which have potential spatial interaction with safety-related SSC. The MT provides structural support for safety-related portions of the Main Steam System. 10 CFR 54.4(a)(2)

2. 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

3.2
6.7
10.1
10.2
10.3
10.4
15.6

License Renewal Boundary Drawings

LR-M-01, Sheet 1
LR-M-01, Sheet 2
LR-M-01, Sheet 3
LR-M-01, Sheet 4
LR-M-02, Sheet 1
LR-M-02, Sheet 3
LR-M-05, Sheet 1
LR-M-05, Sheet 2
LR-M-05, Sheet 3
LR-M-05, Sheet 4
LR-M-06, Sheet 1
LR-M-06, Sheet 2
LR-M-06, Sheet 4
LR-M-06, Sheet 5
LR-M-07, Sheet 2
LR-M-07, Sheet 4
LR-M-19, Sheet 7
LR-M-19, Sheet 8
LR-M-19, Sheet 9
LR-M-19, Sheet 10
LR-M-31, Sheet 1
LR-M-31, Sheet 2
LR-M-31, Sheet 3
LR-M-31, Sheet 4

LR-M-31, Sheet 5
LR-M-31, Sheet 6

Table 2.3.4-7 Main Turbine
Component Subject to Aging Management Review

Component Type	Intended Function
Accumulator	Leakage Boundary
Bolting	Mechanical Closure
Flow Device	Leakage Boundary
Piping, piping components, and piping elements	Leakage Boundary
Tanks (EHC drain tank)	Leakage Boundary
Tanks (Moisture Separators)	Leakage Boundary
Turbine Casings (High Pressure Casing)	Leakage Boundary
Turbine Casings (Low Pressure Exhaust Hoods)	Containment, Holdup and Plateout
Valve Body	Leakage Boundary

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

Table 3.4.2-7 Main Turbine
Summary of Aging Management Evaluation

2.4 SCOPING AND SCREENING RESULTS: STRUCTURES

The following structural components are addressed in this section:

- 220 and 500 kV Substations (2.4.1)
- Admin Building Shop and Warehouse (2.4.2)
- Auxiliary Boiler and Lube Oil Storage Enclosure (2.4.3)
- Circulating Water Pump House (2.4.4)
- Component Supports Commodities Group (2.4.5)
- Control Enclosure (2.4.6)
- Cooling Towers (2.4.7)
- Diesel Oil Storage Tank Structures (2.4.8)
- Emergency Diesel Generator Enclosure (2.4.9)
- Piping and Component Insulation Commodity Group (2.4.10)
- Primary Containment (2.4.11)
- Radwaste Enclosure (2.4.12)
- Reactor Enclosure (2.4.13)
- Service Water Pipe Tunnel (2.4.14)
- Spray Pond and Pump House (2.4.15)
- Turbine Enclosure (2.4.16)
- Yard Facilities (2.4.17)

2.4.1 220 and 500 kV Substations

Description

The 220 and 500 kV Substations are composed of two separate substations providing offsite power for both Unit 1 and Unit 2. The 220 Substation is located north-west of the power block. The 500 kV Substation is located south-east from the power block. The two offsite power sources do not share any common structures, systems, or components external to the generating system. However, there is a tie line between the two substations which connects the 220-500 kV substations through a bus tie transformer and transmission line. Internal to the generating station, the offsite sources terminate in a common room on separate and independent buses which are separated from each other.

220 kV Substation:

The 220 kV Substation is located in a fenced area north-west of the powerblock and outside of the protected area. Its foundations consist of reinforced concrete slabs, footings and equipment foundations on soil. The substation design includes manholes and ductbanks for routing electrical cable. The substation is a nonsafety-related, non-seismic structure.

The purpose of the 220 kV Substation is to provide physical support, shelter, and protection to the substation equipment and the13 kV System and provide a tie in point for the two transmission lines. The offsite 220 kV system consists of two 220 kV transmission lines connected to a breaker-and-a-half design with one 220 kV-13 kV transformer. The offsite 220 kV and 13 kV systems also receives off site electric power through the Number 4 bus tie auto transformer, via the 220 kV tie line. Offsite power is provided as a start-up source and to safeguard systems during normal and abnormal conditions. The offsite 220 kV systems receives site generated power and transmits over two transmission lines: Cromby 220-60 and Cromby 220-61. The 220 kV substation and the associated substation structures and foundation systems are classified as nonsafety-related and their failure does not impact a safety-related function. The 220 kV substations is a non-seismic structure, is relied upon to provide offsite power during Station Blackout (SBO) and Fire Safe Shutdown and is therefore, in scope of license renewal.

500 kV Substation:

The 500 kV Substation is located in a fenced area south-east of the powerblock and outside of the protected area. Its foundations consist of reinforced concrete slabs, beams, grade beams, walls, piers and footings founded on soil. The substation design includes manholes and ductbanks for routing electrical cable.

The purpose of the 500 kV Substation is to provide physical support, shelter, and protection to the substation equipment and 13 kV System and provide a tie in point for the three transmission lines. The offsite 500 kV system consists of three 500 kV transmission lines connected to a breaker-and-a-half design with one 500 kV-13 kV transformer. The 500 kV Substation also contains the Number 4 bus tie auto transformer which links the 220 kV Substation to the 500 kV Substation. The Number 4 bus tie auto transformer is located in the 500 kV Substation yard. The offsite 500 kV system receives site generated power and transmits over three transmission lines: Whitpain 5030, Whitpain 5031, and the Peach Bottom

5010. The 13 kV and offsite 500 kV systems and the associated substation structures and foundations are classified as nonsafety-related and their failure would not impact a safety-related function. The 500 kV Substation is a non-seismic structure. The 500 kV Substation is relied upon to provide offsite power during Station Blackout (SBO) and Fire Safe Shutdown and is therefore, in scope of license renewal.

Included in the boundary of the 220 kV and 500 kV Substations are structural bolting, concrete, concrete anchors and embedments, concrete foundations, equipment foundations, cable trays, conduit, doors, manholes, duct banks, hatches, plugs, metal components, metal panels, and panels, racks, cabinets and other enclosures, miscellaneous steel, seals, gaskets, and moisture barriers, transmission and takeoff towers, and roofing. Components and structures that provide structural support, shelter, and protection of the 13 kV System, and the 220 kV and 500 kV Substations are in scope of license renewal. Other components and structures in the Substations 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 Substations.

Not included in the evaluation boundary of the 220 kV and 500 kV Substations are electrical components, commodities and equipment component supports, electrical components, fire barriers, and commodities which are evaluated separately under the respective electrical system and commodity grouping. Component Supports are identified and separately evaluated in the Component Supports Commodity Group section. The fire barriers are evaluated with the Fire Protection System. Also not included is the 66-13 kV Substation which is physically not connected to LGS as an offsite power source, but could in a emergency serve as a alternate source of off-site power when physically connected and used as in the event of loss of one of the 220 kV or 500 kV Substations.

For more detailed information see UFSAR Section 1.2.4.4, 8.1.2, and 8.2.

<u>Reason for Scope Determination</u>

The 220 and 500 kV Substations are not in scope under 10 CFR 54.4(a)(1) because no portions of the structure are safety-related or relied upon to remain functional during and following design basis events. The 220 and 500 kV Substations 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 220 and 500 kV Substations 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 220 and 500 kV Substations 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 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

1.2.4.4
8.1.2
8.2
Figure 8.2-1
Figure 8.2-2

License Renewal Boundary Drawings

LR-C-2

Table 2.4-1 **<u>220 and 500 kV Substations</u>**
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting (Structural)	Structural Support
Cable Trays	Structural Support
Concrete Anchors	Structural Support
Concrete Embedments	Structural Support
Concrete: Equipment Foundation (accessible)	Structural Support
Concrete: Equipment Foundation (inaccessible)	Structural Support
Concrete: Foundation (accessible) (Substation Control House slab and foundation)	Shelter, Protection
	Structural Support
Concrete: Foundation (inaccessible) (Substation Control House slab and foundation)	Shelter, Protection
	Structural Support
Conduit	Shelter, Protection
	Structural Support
Doors	Shelter, Protection
Hatches/Plugs (includes manhole covers)	Flood Barrier
	Shelter, Protection
	Structural Support
Manholes, & Duct Banks	Shelter, Protection
	Structural Support
Metal components: All structural members	Structural Support
Metal panels: (Including Roofing Panels)	Shelter, Protection
	Structural Support
Miscellaneous steel (includes floor grating)	Structural Support
Panels, Racks, Cabinets, and Other Enclosures	Shelter, Protection
	Structural Support
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Flood Barrier
	Shelter, Protection
Transmission Towers (includes takeoff towers)	Structural Support

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

Table 3.5.2-1 220 and 500 kV Substations
Summary of Aging Management Evaluation

2.4.2 Admin Building Shop and Warehouse

Description

The Admin Building Shop and Warehouse complex includes the Admin Building (also known as the Graham Leitch Building or the Administration Building) and an attached warehouse, which contains office and maintenance facilities. The Admin Building is located east of and immediately adjacent to the Unit 2 Reactor Enclosure and the Unit 2 Turbine Enclosure. The Admin Building Shop and Warehouse is an irregularly shaped multi-story enclosure approximately 284 feet by 270 feet in plan comprised of reinforced concrete, structural steel frame and floor beams, precast concrete panels, masonry walls, commercial grade finished office interior elements including drywall, glass, and a built up roof on metal decking. The Admin Building Shop and Warehouse is founded on a reinforced concrete foundation on rock. The Admin Building portion also contains a maintenance shop at its ground level and contains utility and personnel facilities below grade.

The Admin Building Shop and Warehouse is classified as a nonsafety-related Seismic Category II structure. The Admin Building was analytically evaluated to ensure that it does not collapse on or otherwise impair the integrity of adjacent Seismic Category I structures when subjected to the design seismic loads. Structural separations have been provided to ensure that interaction between Category I and non-Category I structures does not occur. The minimum separation gap between the buildings is twice the relative displacement for the design seismic loads. The Admin Building also houses a fire equipment locker which contains fire fighting tools. These tools are periodically inspected by procedure to replenish, inspect and verify the equipment which is used by the fire brigade is available when responding to postulated fires outside of the power block.

The purpose of the Admin Building Shop and Warehouse is to provide support, shelter, and protection for site personnel and their office space, shop area, and storage in the support of the Limerick Generating Station Units 1 and 2. The Admin Building is in the vicinity of the Reactor Enclosures and partially above the Auxiliary Boiler (Machine Shop) pipe tunnel and is required to maintain its structural integrity during the postulated design basis events to prevent impacting Category I structures and therefore, it is in scope for license renewal. The Warehouse portion with its offices and maintenance areas is contiguous with and an integral part of the Admin Building and is therefore in scope for license renewal.

Included in the boundary of the Admin Building Shop and Warehouse are the structural elements of the building comprised of reinforced concrete, structural steel, and masonry block. Other components in the boundary of the building include precast panels, metal decking, built up roofing, concrete anchors, concrete embedments, doors, glass, louvers, compressible joints and seals, cable trays, conduit, seals, gaskets, and moisture barriers, structural bolting, stairs, elevators, penetration seals, penetration sleeves, panels, racks and other enclosures, and finished elements of office and personnel areas such as carpet, tile, drywall and interior dividers.

Evaluation of the Admin Building Shop and Warehouse boundary concluded that structural elements of the building required for the building to maintain its structural integrity during design basis events and elements providing shelter protection for these structural elements are in scope for license renewal. These include structural bolting, seismic gap filler, concrete anchors, concrete embedments, louvers, reinforced concrete elements and foundation, doors, masonry walls, metal components (all structural members), metal decking, miscellaneous steel, built up roofing and scuppers, panels, racks, cabinets, and other enclosures, precast concrete panels, penetration seals and sleeves, and seals, gaskets and moisture barriers, and windows. The remaining components included in the boundary of the Admin Building Shop and Warehouse including the drywall, tile and other finished elements of the office and personnel areas do not perform an intended function and are 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 Admin Building Shop and Warehouse.

Not included in the boundary of the Admin Building Shops and Warehouse are component supports, cranes and hoists, elevators, heating, ventilation and air conditioning, other electrical or mechanical utilities, and other non structural components.

For more detailed information, see UFSAR Section 3.7.2.8.

Reason for Scope Determination

The Admin Building Shop and Warehouse is not in scope under 10 CFR 54.4(a)(1) because no portions of the structure are safety-related or relied upon to remain functional during and following design basis events. The Admin Building Shop and Warehouse 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 Admin Building Shop and Warehouse 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 Admin Building Shop and Warehouse 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 (SSCs) 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

3.7.2.8

License Renewal Boundary Drawings

LR-C-2

Table 2.4-2 Admin Building Shop and Warehouse
Component 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)	Shelter, Protection
	Structural Support
Concrete: Above-grade exterior (inaccessible)	Shelter, Protection
	Structural Support
Concrete: Below-grade exterior (inaccessible)	Shelter, Protection
	Structural Support
Concrete: Foundation (inaccessible)	Shelter, Protection
	Structural Support
Concrete: Interior	Shelter, Protection
	Structural Support
Doors	Shelter, Protection
Masonry walls: Interior	Structural Support
Metal components: All structural members	Structural Support
Metal decking	Structural Support
Miscellaneous steel (catwalks, stairs, handrails, ladders, vents and louvers, platforms, etc.)	Shelter, Protection
	Structural Support
Panels, Racks, Cabinets, and Other Enclosures	Shelter, Protection
	Structural Support
Penetration seals	Shelter, Protection
Penetration sleeves	Structural Support
Precast Panel	Shelter, Protection
Roofing: (Built Up Roofing)	Shelter, Protection
Roofing: (Scuppers)	Direct Flow
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Shelter, Protection
Seismic Gap Filler	Expansion/Separation
Windows (includes Glass Panels)	Shelter, Protection

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

Table 3.5.2-2 Admin Building Shop and Warehouse
Summary of Aging Management Evaluation

2.4.3 Auxiliary Boiler and Lube Oil Storage Enclosure

Description

The Auxiliary Boiler and Lube Oil Storage Enclosure includes the Fuel Oil Pump House enclosure and the Auxiliary Boiler Pipe Tunnel (also known as the Machine Shop Pipe Tunnel).

Auxiliary Boiler Enclosure:

The Auxiliary Boiler enclosure is a Seismic Category II structural steel, concrete block and precast concrete panel enclosure which uses the eastern portion of the external Reactor Enclosure exterior wall as part of the enclosure. The building is approximately 21 feet by 72 feet in plan area and is a multi-story structure housing the auxiliary boiler and associated control and supporting equipment. The enclosure is located above a below-grade pipe tunnel which contains steam piping and miscellaneous safety-related and nonsafety-related piping. The pipe tunnel foundation consists of a below grade reinforced concrete slab supported by fill. The roof is composed of a metal deck with a membrane cover located over insulation. The Auxiliary Boiler enclosure is a nonsafety-related structure designed to commercial grade standards. There is a seismic gap provided between the Auxiliary Boiler enclosure and the Reactor enclosure. The Auxiliary Boiler enclosure has been analytically evaluated to ensure that the nonsafety-related structure does not collapse on or otherwise impair the integrity of adjacent Seismic Category I structures when subjected to design seismic loads. The purpose of the Auxiliary Boiler enclosure is to provide physical support, shelter, and protection for the nonsafety-related Auxiliary Steam System components and its supporting systems. Major components housed in the building include the heating boilers, deaerator, water heaters, boiler pumps, fans, blowers, piping and piping components, controls and instrumentation, electrical panels and enclosures, and exhaust stacks. The Auxiliary Boiler enclosure is in the vicinity of the Reactor Enclosure and over the Auxiliary Boiler Pipe Tunnel and is therefore, in scope of license renewal.

Auxiliary Boiler Pipe Tunnel

The Auxiliary Boiler Pipe Tunnel is a reinforced concrete rectangular box enclosure located under the Auxiliary Boiler enclosure and the Lube Oil Storage enclosure and runs north to the Turbine Enclosure. It is located adjacent to the Unit 2 Reactor Enclosure. The tunnel is approximately 174 feet in length and 21 feet in width and between 8 feet and 12 feet high. The bottom slab is founded on bedrock or on fill material. The roof of the slab is approximately 18 inches thick and its roof is flush with grade. The purpose of the Auxiliary Boiler Pipe Tunnel is to provide structural support for Unit 1 and Unit 2 piping and the structures founded on the tunnel. The pipe tunnel houses safety-related and nonsafety-related piping into the power block. Therefore, it is in scope of license renewal.

Lube Oil Storage Enclosure:

The Lube Oil Storage enclosure is a Seismic Category II precast concrete panel enclosure which attaches to, and uses the southern side of the Auxiliary Boiler enclosure exterior masonry block wall as part of the enclosure. The building is approximately 21 feet by 32 feet in plan area and is a single story structure which houses lubricating oil and instrument calibration equipment and work areas along with miscellaneous portable equipment. The roof is made of precast concrete panels with a built up elastomer exterior coating. The exterior walls are comprised of precast concrete panels, secured to the steel frame. The enclosure is located above a below-grade pipe tunnel which contains miscellaneous safety-related and nonsafety-related piping. The pipe tunnel foundation consists of a below grade reinforced concrete slab supported by fill. The Lube Oil Storage enclosure is a nonsafety-related structure designed to commercial grade standards. This structure is separated from safety-related systems, structures, and components (SCCs) such that its failure would not impact a safety-related function.

The purpose of the Lube Oil Storage enclosure is to provide physical support, shelter, and protection for the nonsafety-related equipment located inside the enclosure. The Lube Oil Storage enclosure does not perform an intended function and is therefore, not in scope of license renewal.

Fuel Oil Pump House Enclosure:

The Fuel Oil Pump House enclosure is a Seismic Category II structural steel and concrete structure with precast concrete exterior panels located south of the powerblock. The building is a single story structure. The enclosure is approximately 25 feet by 40 feet in plan area and houses the fuel oil transfer and supply pumps and associated control equipment. The building foundation consists of a reinforced concrete slab on grade supported on fill. The roof is made of precast concrete panels with a built up elastomer exterior coating. The exterior enclosures are composed of precast concrete panels and secured to the steel frame.

The purpose of the Fuel Oil Pump House enclosure is to provide physical support, shelter and protection for the nonsafety-related fuel oil transfer and fuel oil supply pumps that provide fuel to the fuel oil storage tank and feed oil to the nonsafety-related auxiliary boilers and supporting equipment. The Fuel Oil Pump House enclosure houses components required for fire protection, as required by 10 CFR 50.48 and are therefore, in scope of license renewal.

Included in the boundary of the Auxiliary Boiler and Lube Oil Storage Enclosure which also includes the Fuel Oil Pump House enclosure and the Auxiliary Boiler Pipe Tunnel is structural bolting, cable trays and gutters, seismic gap filler, conduit, concrete, concrete anchors and embedments, doors, hatches and plugs, masonry walls, metal components including decking and siding, miscellaneous steel, penetration seals, penetration sleeves, precast panels, roof scuppers, tube track, panels, racks, cabinets and other enclosures, roofing, seals, gaskets, and moisture barriers. These structures either house components required for fire protection, as required by 10 CFR 50.48, or protect safety-related components and are therefore, in scope of license renewal.

Not included in the boundary of the Auxiliary and Lube Oil Storage Enclosure which includes the Fuel Oil Pump House and Auxiliary Boiler Pipe Tunnel are component supports, cranes and hoists, and fire barriers. Component supports are identified and separately evaluated in the Component Support Commodity Group section. Cranes and hoists are evaluated separately with the Cranes and Hoists system. Fire barriers are identified and evaluated with the license renewal Fire Protection System. Also not included are the Auxiliary Boiler and Lube Oil Storage Enclosures are the RHRSW and ESW systems, which are evaluated separately with the license renewal Safety Related Service Water System. Also not included are the Auxiliary Boiler and Lube Oil and Lube Oil components. These components are evaluated separately within the Auxiliary Steam System. The fire protection piping in the enclosures are evaluated within the Fire Protection System.

For more detailed information, see UFSAR Sections 3.2.1, 3.7.2.8, 3.7.3 and 10.4.10.2.

Reason for Scope Determination

The Auxiliary Boiler and Lube Oil Storage Enclosure which includes the Fuel Oil Pump House Enclosure and Auxiliary Boiler Pump House Pipe Tunnel is not in scope under 10 CFR 54.4(a)(1) because no portions of the enclosures are safety-related or relied upon to remain functional during and following design basis events. The Auxiliary Boiler and Lube Oil Storage Enclosure including the Fuel Oil Pump House Enclosure and Auxiliary Boiler Pump House Pipe Tunnel meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the enclosures could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Auxiliary Boiler and Lube Oil Storage Enclosure including the Fuel Oil Pump House Enclosure and Auxiliary Boiler Pump House Pipe Tunnel 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 Auxiliary Boiler and Lube Oil Storage Enclosure including the Fuel Oil Pump House Enclosure and Auxiliary Boiler Pump House Pipe Tunnel 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 scope of license renewal. 10 CFR 54.4(a)(2)

2. 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)

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

3.2.1
3.7.2.8
3.7.3
10.4.10
Table 3.2-1

License Renewal Boundary Drawings

LR-C-2

Table 2.4-3 **Auxiliary Boiler and Lube Oil Storage Enclosure**
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting (Structural)	Structural Support
Cable Trays and Gutters	Structural Support
Concrete Anchors	Structural Support
Concrete Embedments	Structural Support
Concrete: Below-grade exterior (inaccessible)	Shelter, Protection
	Structural Support
Concrete: Foundation (inaccessible)	Shelter, Protection
	Structural Support
Concrete: Interior	Shelter, Protection
	Structural Support
Conduit	Shelter, Protection
	Structural Support
Doors	Shelter, Protection
Hatches/Plugs	Shelter, Protection
	Structural Support
Masonry walls: Above-grade exterior	Shelter, Protection
	Structural Support
Metal components: All structural members	Structural Support
Metal decking	Structural Support
Metal siding	Shelter, Protection
Miscellaneous steel (catwalks, stairs, handrails, ladders, vents and louvers, platforms, etc.)	Filter
	Shelter, Protection
	Structural Support
Panels, Racks, Cabinets, and Other Enclosures	Shelter, Protection
	Structural Support
Penetration seals	Shelter, Protection
Penetration sleeves	Structural Support
Precast Panel	Shelter, Protection
Roofing: (Built up Roofing)	Shelter, Protection
Roofing: (Scuppers)	Direct Flow
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Shelter, Protection
Seismic Gap Filler	Expansion/Separation
Tube Track	Shelter, Protection
	Structural Support

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

Table 3.5.2-3 Auxiliary Boiler and Lube Oil Storage Enclosure
Summary of Aging Management Evaluation

2.4.4 Circulating Water Pump House

Description

The Circulating Water Pump House is a Seismic Category II reinforced concrete structure approximately 42 feet by 274 feet in plan located north of the power block and south of the Cooling Towers. This is a common enclosure that supports both Unit 1 and Unit 2. The northern end of the enclosure is set into an embankment. The foundation of the Circulating Water Pump House is reinforced concrete supported by concrete fill placed on rock. The Circulating Water Pump House is comprised of a reinforced concrete foundation slab and precast panels and reinforced concrete walls. The Circulating Water Pump House is also comprised of concrete and steel grating floors, steel roof beams, and other miscellaneous structural and platform steel. The lower below grade floor elevation is composed of reinforced floor slab with a piping and pump pit with floor plates and grating which contains piping and the circulating water pumps. The main elevation at grade contains the fire protection pumps, service water pumps, chlorination pumps, and supporting equipment. The outer exposed walls are comprised of reinforced concrete precast panels or are poured reinforced concrete. The roof is a built up metal deck with elastomer membrane roofing. The structure also includes retaining walls on the east and west sides and a sump.

The Circulating Water Pump House structure is designed to protect the enclosed portion of the Fire Protection System, Nonsafety-Related Service Water System, Circulating Water System and related components. The portion of the enclosure protecting the Fire Protection System pumps brings the structure in scope for license renewal. These two fire protection pumps are in scope of licensing renewal because the pumps are relied upon in safety analysis for 10 CFR 50.48. The two fire protection pumps are separated by a fire barrier wall and are located in the western portion of the structure.

Equipment housed in the Circulating Water Pump House includes the fire protection pumps and motors, valves and operators, associated piping and their associated electrical and control panels. The Circulating Water Pump House structure also houses or supports nonsafety-related equipment including the nonsafety-related service water pumps and motors, circulating water pumps and motors, chlorination pumps and motors and valves and operators and associated piping, and electrical and control panels, including cranes and hoists.

The purpose of the Circulating Water Pump House is to provide structural support, shelter and protection and access to the Fire Protection System fire pumps and associated piping, valves and related equipment, and to the Circulating Water System and Nonsafety-Related Service Water System pumps, piping, valves and associated equipment.

The Circulating Water Pump House structure is determined in scope in its entirety. Included in the boundary of the Circulating Water Pump House structure are concrete and steel elements of the building, structural bolting, cable trays and gutters, seals, gaskets, and moisture barriers, concrete anchors, concrete curbs and embedments, birdscreen, conduit, doors, hatches and plugs, masonry walls, metal components and metal decking, miscellaneous steel, panels, racks, cabinets and other enclosures, penetration seals and sleeves, precast reinforced concrete panels, roofing, steel elements and tube track.

Refer to the “Components Subject to Aging Management Review” table below for a complete list of components included in the boundary of the Circulating Water Pump House structure.

Included in the boundary of the Circulating Water Pump House structure and determined not to be in scope for license renewal is the building equipment sump which provides no license renewal intended function.

Not included in the boundary of the Circulating Water Pump House structure are cranes and hoists, fire barriers, and component supports. Cranes and hoists are evaluated separately with the Cranes and Hoists System, fire barriers are evaluated with the Fire Protection System, and component supports are evaluated with the Component Support Commodity Group. Components also not included in the boundary of the Circulating Water Pump House structure are the mechanical components for the Fire Protection System components, Nonsafety-Related Service Water System components, and Circulating Water System components which are evaluated separately with their respective mechanical system.

Reason for Scope Determination

The Circulating Water Pump House is not in scope under 10 CFR 54.4(a)(1) because no portions of the structure are safety-related or relied upon to remain functional during and following design basis events. The Circulating Water Pump House 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 Circulating Water Pump House 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 Circulating Water Pump 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), 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). 10 CFR 50.54(a)(3)

UFSAR References

Table 3.2-1
9.5.1.2.2

License Renewal Boundary Drawings

LR-C-2

Table 2.4-4 Circulating Water Pump House
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting (Structural)	Structural Support
Cable Trays and Gutters	Structural Support
Concrete Anchors	Structural Support
Concrete Curbs	Direct Flow
Concrete Embedments	Structural Support
Concrete: Above-grade exterior (accessible)	Shelter, Protection
	Structural Support
Concrete: Above-grade exterior (inaccessible)	Shelter, Protection
	Structural Support
Concrete: Below-grade exterior (inaccessible)	Shelter, Protection
	Structural Support
Concrete: Foundation (inaccessible)	Shelter, Protection
	Structural Support
Concrete: Interior	Shelter, Protection
	Structural Support
Conduit	Shelter, Protection
	Structural Support
Doors	Shelter, Protection
Hatches/Plugs	Shelter, Protection
	Structural Support
Masonry walls: Above-grade exterior	Shelter, Protection
	Structural Support
Masonry walls: Interior	Shelter, Protection
	Structural Support
Metal components: All structural members	Structural Support
Metal decking	Structural Support
Miscellaneous steel (catwalks, stairs, handrails, ladders, vents and louvers, platforms, etc.)	Shelter, Protection
	Structural Support
Panels, Racks, Cabinets, and Other Enclosures	Shelter, Protection
	Structural Support
Penetration seals	Shelter, Protection
	Structural Support
Penetration sleeves	Structural Support
Precast Panel	Shelter, Protection
Roofing: (Built up Roofing)	Shelter, Protection
Roofing: (Scuppers)	Direct Flow

Component Type	Intended Function
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Shelter, Protection
Steel elements: (Birdscreen)	Filter
Tube Track	Shelter, Protection
	Structural Support

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

Table 3.5.2-4 Circulating Water Pump House
Summary of Aging Management Evaluation

2.4.5 Component Supports Commodities 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, sway struts, guides, stops, design clearances, straps, and clamps. Specialty components include snubbers, sliding surfaces, and vibration isolators. The commodity group is comprised of the following supports:

- Supports for ASME Class 1, 2, and 3, piping and component supports, reactor vessel skirt support anchorage, control rod drive (CRD) support and restraints, pump supports, and the reactor vessel support ring girder and anchorage.
- Supports for cable trays, conduit, HVAC ducts, tube track, instrument tubing and non-ASME piping and components.
- Supports for HVAC system components and other miscellaneous mechanical equipment.
- Supports for platforms, jet impingement 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 gravity, thermal, seismic, and other lateral 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 carry a vertical load. 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 in the scope of license renewal. The group also includes supports for SSCs, which are not in 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, lubrite plates, vibration isolators, 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; sliding surfaces, support members, sliding surfaces, welds, bolted connections, support anchorage to building structure; and vibration isolation elements. 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."

Not included in the boundary of the Component Supports Commodity Group are equipment foundations, 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 1.2.4.2.4, 3.6.2, 3.8.2, 3.8.3, 3.9.3, 5.3.3.1.4, 5.4.14, and 6.6

Reason for Scope Determination

The Component Supports Commodities Group meets 10 CFR 54.4(a)(1) because it has safety-related supports that are relied upon to remain functional during and following design basis events. The Component Supports Commodities Group 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 Component Supports Commodities Group also meets 10 CFR 54.4(a)(3) because some 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 (a)(2)

UFSAR References

1.2.4.2.4
3.6.2
3.8.2
3.8.3
3.9.3
5.3.3.1.4
5.4.14
6.6

License Renewal Boundary Drawings

LR-C-2

Table 2.4-5 <u>Component Supports Commodities Group</u>
Component 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 (Support members; constant and variable guides and stops, welds; bolted connections; sliding plates; support anchorage to building structure)	Structural Support
Supports for ASME Class 2 and 3 Piping and Components (Building concrete at locations 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 2 and 3 Piping and Components (Support members; welds; bolted connections; support anchorage to building structure)	Structural Support
Supports for Cable Trays, Gutter, Conduit, HVAC Ducts, Tube Track, Instrument Tubing, Non-ASME Piping and Components (Support members; welds; bolted connections; support anchorage to building structure)	Structural Support
Supports for Cable Trays, Gutters, Conduit, HVAC Ducts, Tube Track, Instrument Tubing, Non-ASME Piping and Components (Building concrete at locations of expansion and grouted anchors; grout pads for support base plates)	Structural Support
Supports for HVAC System Components, and Other Misc Mechanical Equipment (Vibration isolation elements)	Structural Support
	Vibration Isolation
Supports for HVAC System Components, and Other Miscellaneous Mechanical Equipment	Structural Support

Component Type	Intended Function
Supports for HVAC System Components, and Other Miscellaneous Mechanical Equipment (Building concrete at locations of grouted anchors; grout pads for support base plates)	Structural Support
Supports for Platforms, Jet Impingement Shields, Masonry Walls, and Other Miscellaneous Structures	Structural Support
Supports for Platforms, Jet Impingement Shields, Masonry Walls, and Other Miscellaneous Structures (Building concrete at locations 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	Structural Support
Supports for Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (Building concrete and grout pads for support)	Structural Support

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

Table 3.5.2-5 Component Supports Commodities Group Summary of Aging Management Evaluation

2.4.6 Control Enclosure

Description

The Control Enclosure is a Seismic Category I safety-related multi-story structure and is common for Limerick Generating Station Unit 1 and Unit 2. Portions of the structure are constructed above and below grade.

The Control Enclosure is approximately 132 feet by 62 feet in plan area, located north of the Seismic Class I safety-related Reactor Enclosures, and south of the Seismic Class II, nonsafety-related Turbine Enclosure. The Control Enclosure is structurally integrated with the Reactor Enclosures and is separated from Turbine Enclosure by a seismic gap. The Control Enclosure is comprised of reinforced concrete bearing walls, slabs, foundation mat, roof, masonry walls, and structural steel. The reinforced concrete foundation is supported on bedrock. The floors and roof are constructed of reinforced concrete supported by steel beams. The roof is covered by an elastomer roofing membrane.

The Control Enclosure is divided into compartments designed to protect Unit 1 and Unit 2 safety-related systems and components and provides physical separation for redundant mechanical and electrical components. Among these compartments are the control room envelope, cable spreading room, switchgear compartments, and standby gas treatment and miscellaneous equipment compartments.

The control room envelope consists of the common control room, utility room, toilet room, and peripheral offices. The control room contains controls and instrumentation necessary for operation of LGS under normal and abnormal conditions. The facilities located within the control room envelope are designed to be habitable throughout the course of a design basis accident (DBA) and the resulting radiological condition. Control room envelope construction joints and penetrations for cable, pipe, HVAC duct, HVAC equipment, dampers, and steam-tight doors have been designed specifically for leak-tightness.

The cable spreading room and switchgear compartments contain electrical cables, switchgear and battery compartments necessary to support the control and operation of the plant equipment during normal and abnormal conditions. Some of the areas are separated into individual compartments to provide separation of redundant channels.

The common safety-related standby gas treatment compartment contains both trains of the emergency standby gas ventilation equipment and is separated by a barrier wall. These units are located at the highest elevations of the Control Enclosure structure. The Standby Gas Treatment System supports both Unit 1 and Unit 2 during normal and abnormal conditions.

The Control Enclosure also includes miscellaneous compartments throughout the structure that house the Control Enclosure Ventilation System, supporting cooling systems and some waste collection compartments. The cooling and waste collection compartments are located in the lower elevations of the Control Enclosure and away from the control room envelope. The upper levels of the enclosure contain the control room ventilation and miscellaneous ventilation equipment for the Control Enclosure. This equipment is used to support station operation during both normal and abnormal operating conditions.

The purpose of the Control Enclosure 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 in conjunction with the Control Enclosure 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 Control Enclosure also supports and protects both safety and nonsafety-related equipment.

Included in the boundary of the Control Enclosure are structural elements of the building comprised of reinforced concrete, metal components, and masonry walls. Other components also included in the boundary of the building are blowout panels, bolting, cable trays and gutters, concrete anchors and embedments, conduits, curbs, doors, equipment supports and foundations, hatches and plugs, metal panels, miscellaneous steel, panels, racks, cabinets and other enclosures, penetration seals and sleeves (including bellows-type expansion joints), roofing, seals, gaskets and moisture barriers, seismic gap fillers, steel elements, and tube track. Precast panels on this enclosure are surface facades for appearance which cover the underlying exterior reinforced concrete walls. The precast panels on this enclosure functioned as forms during construction placing of exterior wall concrete, but the precast panels do not perform an intended function and are not in scope for 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 Control Enclosure.

Not included in the boundary of the Control Enclosure are component supports, cranes and hoists, building elevators, fire barriers and piping and component insulation. Component supports are evaluated with the Component Supports Commodity Group, the cranes and hoists are evaluated with the Cranes and Hoists System, and fire barriers are evaluated with the Fire Protection System. The piping and component insulation is evaluated with the Piping and Component Insulation Commodity Group. Components also not included in the boundary of the Control Enclosure structure are the mechanical components evaluated with the Standby Gas Treatment System, the Control Enclosure Ventilation System, the Radwaste System and the Miscellaneous Ventilation System.

Also not included in the boundary of the Control Enclosure is the adjacent tunnel located in the Turbine Enclosure which runs along the north, east and west sides of the Control Enclosure. This tunnel is used to route plant process piping around the Control Enclosure. Also not included are the main steam tunnels which are described as part of the Reactor Enclosure.

For more detailed information, see UFSAR Sections 3.8.4.1.2 and 6.4.

<u>Reason for Scope Determination</u>

The Control Enclosure 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 Control Enclosure 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 Control Enclosure 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 radiation shielding protection for personnel and equipment/components. 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 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)

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 Fire Protection (10 CFR 50.48). 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 regulations for Environmental Qualification (10 CFR 50.49). 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 Anticipated Transients Without Scram (10 CFR 50.62). 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 Station Blackout (10 CFR 50.63). 10 CFR 54.4(a)(3)

UFSAR References

3.5
3.7
3.8.4
6.4
Table 3.2-1
Table 3.3-2

License Renewal Boundary Drawings

LR-C-2

Table 2.4-6 Control Enclosure
Component Subject to Aging Management Review

Component Type	Intended Function
Blowout Panels	Pressure Relief
Bolting (Structural)	Structural Support
Cable Trays and Gutters	Structural Support
Concrete Anchors	Structural Support
Concrete Curbs	Direct Flow
Concrete Embedments	Structural Support
Concrete: Above-grade exterior (accessible)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Pressure Boundary
	Structural Support
Concrete: Above-grade exterior (inaccessible)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Pressure Boundary
	Structural Support
Concrete: Below-grade exterior (accessible)	Structural Pressure Boundary
Concrete: Below-grade exterior (inaccessible)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Structural Support
Concrete: Foundation (inaccessible)	Flood Barrier
	Shelter, Protection
	Structural Support
Concrete: Interior	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Pressure Boundary
	Structural Support
Conduit	Shelter, Protection
	Structural Support
Doors	Flood Barrier
	HELB/MELB Shielding
	Missile Barrier
	Shelter, Protection
	Structural Pressure Boundary

Component Type	Intended Function
Equipment supports and foundations	Structural Support
Hatches/Plugs	Missile Barrier
	Shelter, Protection
	Structural Support
Masonry walls: Interior	Shelter, Protection
	Shielding
	Structural Support
Metal components: All structural members	Structural Support
Metal panels	Structural Support
Miscellaneous steel (catwalks, stairs, handrails, ladders, vents and louvers, platforms, etc.)	Shelter, Protection
	Structural Support
Panels, Racks, Cabinets, and Other Enclosures	Structural Support
Penetration seals	Flood Barrier
	HELB/MELB Shielding
	Shelter, Protection
	Shielding
	Structural Pressure Boundary
Penetration sleeves	Flood Barrier
	Structural Pressure Boundary
	Structural Support
Roofing	Shelter, Protection
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Flood Barrier
	HELB/MELB Shielding
	Shelter, Protection
	Structural Pressure Boundary
Seismic Gap Filler	Expansion/Separation
Steel elements: (Birdscreen)	Filter
Steel elements: liner(sump), integral attachments	Water retaining boundary
Tube Track	Shelter, Protection
	Structural Support

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

Table 3.5.2-6 Control Enclosure
Summary of Aging Management Evaluation

2.4.7 Cooling Towers

Description

The Cooling Tower structures include the two Cooling Towers and Cooling Tower basins, the circulating water chlorine and acid feed enclosures, associated outdoor tanks and the common sample station enclosure and common valve and meter pit. The Cooling Tower Structures are located north of the Reactor Enclosures.

The natural draft Cooling Towers are Seismic Category II reinforced concrete structures designed and sized for cooling circulating water service systems and the main condensers. Each Cooling Tower basin contains sufficient water capacity (7,200,000 gallons) to provide the source of fire protection water for LGS. There are two Cooling Towers located at LGS with one tower each dedicated to cooling Unit 1 and Unit 2.

The Cooling Towers are reinforced concrete hyperbolic natural draft Cooling Towers founded on a reinforced concrete foundation supported on rock. The reinforced concrete cooling tower basin is supported on soil fill. The circulating water chlorine, acid feed enclosure and common sample station enclosures consist of commercial grade enclosures supported on reinforced concrete slabs on soil with reinforced concrete slabs for indoor and outdoor chemical tank foundations. The Cooling Tower structures are nonsafety-related and separated from safety-related systems, structures, and components such that their failure would not impact a safety-related function.

The purpose of the reinforced concrete Cooling Towers is to provide a source of cooling water for the Circulating Water System, and the Nonsafety-Related Service Water System. The Cooling Tower basins provide the source of water for the Fire Protection System. The diesel and electric fire pumps required for 10 CFR 50.48 are located in the Circulating Water Pump House enclosure. Each of the fire pumps draw suction supply water from the gravity fed Circulating Water System supply headers extending from the cooling tower basins to the main condensers. It also provides a nonsafety-related backup source of water for the emergency service water systems and residual heat removal service water systems.

The reinforced concrete Cooling Tower basins are the only portion of the Cooling Tower structure that are in scope for license renewal because these basins are the source of water for the Fire Protection System. The remainder of the Cooling Towers and supporting structures have no safety-related or other license renewal intended function.

The Cooling Towers are located well north of the powerblock and located over 500 feet from any equipment or structure important to reactor safety in the event of a postulated tower collapse. The two fire pumps can both be aligned to either Cooling Tower in the event of maintenance, tower collapse, or failure of a Cooling Tower basin. Each Cooling Tower basin is approximately 488 feet in diameter with a 9-foot high basin curb wall. The basin concrete slabs are founded on soil fill.

Two circulating water chlorine and acid feed enclosures located near the Cooling Towers house the chemicals and injection equipment for chlorination and acid used to treat and maintain chemical properties in each of the Cooling Tower basins. Each of the enclosures is dedicated and support one of the Cooling Towers to maintain water chemistry within the basin. Additionally, located in the vicinity of the chlorine and acid feed enclosures is a common sample station enclosure which is used to monitor the quality of water in each of the Cooling Towers.

A common below grade reinforced concrete valve and metering pit is located between both of the Cooling Tower basins and just north of the Circulating Water chlorine and acid feed enclosures. Located within the below grade valve and meter pit are the blow-down and makeup water piping and control valves which support both of the Cooling Tower basins.

Included in the boundary of the Cooling Tower structures and determined to be in scope for license renewal are the reinforced concrete Cooling Tower basin slabs, foundations, basin walls and the seals, gaskets, and moisture barriers used to contain and provide the source of water for the Fire Protection system.

Refer to “Components subject to Aging Management Review” table below for a complete list of components included in the boundary of the Cooling Tower enclosures.

Included in the boundary of the Cooling Tower structure and determined not to be in scope for license renewal are the natural draft hyperbolic cooling towers, fill, louvers, water flume, shell support columns, the circulating water chlorine and acid feed enclosures, the common sample station enclosure, and the common valve and metering pit and circulating and water piping and associated outlet basin screens, and miscellaneous cooling tower components.

Not included in the boundary of the Cooling Towers are fire barriers and component supports. Fire barriers are evaluated separately with the Fire Protection System, and the component supports are evaluated with the Component Supports Commodity Group. Components also not included in the boundary of the Cooling Tower structures are the circulating water piping and screens, the piping and the mechanical components for the RHRSW and ESW and Fire Protection systems which are evaluated with the Safety Related Service Water System and the Fire Protection license renewal systems.

For more detailed information, see UFSAR Sections 2.5.4.5.1, 3.4.1.1, 9.2.6.3.3, 9.5.1.2.2.1, and 10.4.5.

Reason for Scope Determination

The Cooling Towers are 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 Cooling Towers are not in scope under 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the structures would not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Cooling Towers also meet 10 CFR 54.4(a)(3) because they are 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 Cooling Towers are 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. Directs flow to provide cooling water 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). The Cooling Tower basin is the source of water for the Fire Protection System. (UFSAR 9.5.1.2.2.1)

UFSAR References

1.2.4.2.19
1.2.4.2.20
1.2.4.6.1
1.2.4.7.7
2.5.4.5.1
3.4.1.1
9.2.6.3.3
9.5.1.2.2.1
10.4.5

License Renewal Boundary Drawings

LR-C-2

Table 2.4-7 Cooling Towers
Component Subject to Aging Management Review

Component Type	Intended Function
Concrete: Above-grade exterior and interior (accessible) (includes basin curb wall, inlet and outlet walls)	Structural Support
	Water retaining boundary
Concrete: Foundation (accessible) (Basin Slab)	Structural Support
	Water retaining boundary
Concrete: Foundation (inaccessible) (Basin Slab)	Structural Support
	Water retaining boundary
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Water retaining boundary

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

Table 3.5.2-7 Cooling Towers
Summary of Aging Management Evaluation

2.4.8 Diesel Oil Storage Tank Structures

Description

The Diesel Oil Storage Tank Structures are seismic Category I below grade structures. The Diesel Oil Storage Tank Structures are comprised of below grade base slab, below grade excavated slope, structural backfill around the fuel oil tanks, and a valve pit or manhole allowing access to each tank. Also included are the oil unloading area concrete slab and the metal enclosure located over the valve pits. The Diesel Oil Storage Tank Structures are located south of the Unit 1 Reactor Enclosure and approximately 150 feet from the emergency diesel generators. The diesel storage tanks are located approximately 9 feet below grade. The structure contains eight buried fuel oil storage tanks and eight tank access manholes, one for each emergency diesel generator.

The purpose of the Diesel Oil Storage Tank Structures is to provide access, support, shelter, and protection to the below grade Emergency Diesel Generator System fuel oil tanks to ensure that they remain operable during and after the design basis wind, tornadoes, floods, earthquake and missiles. The structures protect the eight tanks which provide sufficient fuel to the diesel generators for an extended period of time to support plant operation under normal and accident conditions.

The Diesel Oil Storage Tank Structures reinforced concrete base slab is founded on bed rock or dense natural soil to support the eight buried tanks. The sides of the excavation are sloped and partially lined with shotcrete and a waterproof membrane to contain an oil spill. The buried below grade structure also contains two oil sumps which are designed to collect any liquids from the pit area through buried corrugated metal pipe routed around the perimeter of the tank pit area. Each of the eight tanks is supported in the excavated pit on a sand base on top of the base slab. Hold down anchor bolts supported the tanks during construction backfilling with a cementatious fill. There are eight reinforced concrete access manholes located over top of the eight tanks. The access manholes contain the manways, vent lines, return lines, fuel lines and fill lines. Also located just north of the access manways is a concrete unloading area slab at grade level.

The surface at grade above the eight buried tanks is paved with asphalt except where the eight individual access manholes are raised above the surface and the reinforced concrete truck unloading pad just north of the manholes. A metal enclosure (butler building) is located over the Diesel Oil Storage Tank Structures which provides shelter for personnel accessing the manhole pits during maintenance and inspection activities. The metal butler building is only for shelter for personnel accessing the manholes and it does not provide a license renewal intended function.

Included in the boundary of the Diesel Oil Storage Tank Structures and determined to be in scope for license renewal are bolting (structural), seals, gaskets, and moisture barriers, concrete anchors, concrete manholes, concrete foundation, hatches (including manhole covers), miscellaneous steel, penetration seals, and penetration sleeves.

Refer to the “Components Subject to Aging Management Review” table below for a completed list of components included in the boundary for the Diesel Oil Storage Tank Structures.

Included in the boundary of the Diesel Oil Storage Tank Structures and determined not to be in scope for license renewal is the metal enclosure located over the 8 manhole valve pits, the surface concrete unloading pad, the asphalt paving, the backfill, the shotcrete and waterproof membrane liner on the below grade slopes, and the sump pits. The metal enclosure is provided for personnel environmental shelter during access to the manhole valve pits. It does not perform a license renewal intended function and its failure does not prevent satisfactory accomplishment of a safety-related function. Backfill over buried piping and tanks is not in scope for license renewal. The below grade shotcrete and membrane slope liner are provided to contain any oil leakage that could occur and do not provide a license renewal intended function. The sump pits provide access and a location to install temporary pumps for the removal of any potential liquids or oil from the structure in the event of a spill and do not provide a license renewal function.

Not included in the boundary of the Diesel Oil Storage Tank Structure are the component supports. Component supports are evaluated separately with the Component Supports Commodity Group. Components also not included in the boundary of the Diesel Oil Storage Tank Structure are the buried storage tanks, piping and mechanical components for the fuel oil storage tanks which are evaluated with the Emergency Diesel Generator System.

For more detailed information, see UFSAR Sections 3.4.1, 3.9.2, and 9.5.4.

<u>Reason for Scope Determination</u>

The Diesel Oil Storage Tank Structures 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 Oil Storage Tank Structures 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 Diesel Oil Storage Tank 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 Diesel Oil Storage Tank Structures are 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 (SSCs). 10 CFR 54.4(a)(1)

2. 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)

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 Station Blackout (10 CFR 50.63). 10 CFR

54.4(a)(3)

UFSAR References

Table 3.2-1
3.4.1.1
3.9.2.2b.2.6
9.5.4

License Renewal Boundary Drawings

LR-C-2

Table 2.4-8 **Diesel Oil Storage Tank Structures**
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting (Structural)	Structural Support
Concrete Anchors	Structural Support
Concrete: Above-grade exterior (accessible) (valve pits)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Structural Support
Concrete: Below-grade (inaccessible) (walls, and base of valve pits)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Structural Support
Concrete: Below-grade interior (accessible) walls, ceiling, base slab	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Structural Support
Concrete: Foundation (inaccessible) (base slab)	Structural Support
Conduit	Shelter, Protection
	Structural Support
Hatches/Plugs (including manhole cover)	Flood Barrier
	Shelter, Protection
	Structural Support
Miscellaneous steel (ladders)	Structural Support
Penetration seals	Flood Barrier
	Shelter, Protection
Penetration sleeves	Flood Barrier
	Shelter, Protection
	Structural Support
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Flood Barrier
	Shelter, Protection

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

Table 3.5.2-8 Diesel Oil Storage Tank Structures
Summary of Aging Management Evaluation

2.4.9 Emergency Diesel Generator Enclosure

Description

The Emergency Diesel Generator Enclosure includes a separate Unit 1 and Unit 2 Emergency Diesel Generator Enclosure. Each Emergency Diesel Generator Enclosure is a single story multi-level Seismic Category I structure. Each Emergency Diesel Generator Enclosure is divided into four compartments or bays which each house an emergency diesel generator unit. The enclosures are located south of the Seismic Category I Reactor Enclosure(s). The Unit 1 Emergency Diesel Generator Enclosure is east of the Radwaste Enclosure. The Unit 2 Emergency Diesel Generator Enclosure is west of the Auxiliary Boiler and Lube Oil Storage Enclosure. The Emergency Diesel Generator Enclosure(s) are also south of the Service Water Pipe Tunnel which is located along the northern end of each enclosure. Each Emergency Diesel Generator Enclosure includes a roof extension and metal panels above the Service Water Pipe Tunnel which provide a personnel access corridor to the to the individual diesel bays. Located between the two Emergency Diesel Generator Enclosures are the Reactor Enclosure(s) railroad airlock and the equipment airlocks for Limerick Generating Station Unit 1 and Unit 2. The railroad and equipment airlocks which are part of the Reactor Enclosure.

Each diesel compartment or bay consists of an upper mezzanine level which contains support equipment for the diesel generator. Each enclosure is approximately 273 feet by 86 feet in plan area, and is comprised of reinforced concrete walls, slabs, foundation mat, roof, masonry walls, and structural steel. The roof is reinforced concrete supported by structural steel, protected by an elastomer roof membrane. The walls of each Emergency Diesel Generator Enclosure are founded on bedrock. The base slab is supported by concrete fill placed on bedrock.

Removable concrete panels and reinforced concrete plugs are located on the south wall of each bay for maintenance purposes.

Each diesel generator unit is enclosed in its own reinforced concrete missile protected compartment or bay which is designed to provide physical separation for redundant mechanical and electrical safety-related components. The upper mezzanine portion of each bay contains the air intakes, exhaust, ventilation, and coolant support system. Each bay also contains an overhead crane which support maintenance activities.

Each bay contains a diesel generator, fuel oil day tank, air receivers and compressor, MCC, and control panel. The below grade trench area is used to route process piping and contains the lower portions of the generator and diesel engine. Located at grade, in the far northern end of the Emergency Diesel Generator Enclosure is a personnel access corridor used for access into each of the individual emergency diesel generator bays. Included in the far end of the corridor is a condensate room. The Service Water Pipe Tunnel is directly below the access corridor and contains process piping that supports the emergency diesel generators and other power block components. The Service Water Pipe Tunnel is addressed as a separate structure.

The purpose of the Emergency Diesel Generator Enclosure is to provide structural support, shelter, access control, and protection to safety-related systems, components and structures housed within it during operation and during postulated design basis accidents. Each

Emergency Diesel Generator Enclosure is divided into four separate bays, one for each of the four diesel generators provided per unit. Major components contained within the Emergency Diesel Generator Enclosure include the emergency diesel generators, electrical switchgear, HVAC diesel compartment cooling and ventilation equipment, and miscellaneous equipment required to support the operation and maintenance of the emergency diesel generators.

Included in the boundary of the Emergency Diesel Generator Enclosure and determined to be in scope for license renewal are reinforced concrete elements of the building, walls, foundation, roofing and roof scuppers, doors, metal components, miscellaneous steel, metal decking, bolting, concrete anchors, concrete embedments, metal panels, ladders, penetration sleeves, penetration seals, conduit, cable trays and gutters, metal panels, concrete curbs, seals, gaskets, and moisture barriers, panels, racks, cabinets and other enclosures, seismic gap filler, hatches, plugs, tube track, equipment supports, and foundations. Precast panels on this enclosure are surface facades for appearance which cover the underlying exterior reinforced concrete walls and removable reinforced concrete plugs. The precast panels on this enclosure do not perform an intended function and are not in scope for 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 Emergency Diesel Generator Enclosure.

Not included in the boundary of the Emergency Diesel Generator Enclosure are cranes and hoists, fire barriers, pipe tunnel, component supports, and the railroad airlock and equipment airlocks. Cranes and hoists are evaluated separately with the Cranes and Hoists system, fire barriers are evaluated separately with the Fire Protection System. The pipe tunnel is evaluated with the Service Water Pipe Tunnel. Component supports are evaluated with the Component Supports Commodity Group. The railroad airlock and equipment airlocks are evaluated with the Reactor Enclosure. Components also not included in the boundary of the Emergency Diesel Generator Enclosure are the mechanical components for the 4 kV system, the diesel generators, diesel generator fuel oil system, diesel generator enclosure ventilation system, and emergency service water (ESW) system which are evaluated with the Emergency Diesel Generator System, Emergency Diesel Generator Enclosure Ventilation System, and Safety Related Service Water System.

For more detailed information, see UFSAR Sections 2.5.4.10.1.1, 3.8.4.1.3, and 3.8.5.1.2

<u>Reason for Scope Determination</u>

The Emergency Diesel Generator Enclosure 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 Emergency Diesel Generator Enclosure 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 Emergency Diesel Generator Enclosure 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 Emergency Diesel Generator Enclosure 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 (SSCs). 10 CFR 54.4 (a)(1)

2. 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)

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

2.5.4.10.1.1
3.8.4.1.3
3.8.5.1.2
Table 3.2-1

License Renewal Boundary Drawings

LR-C-2

Table 2.4-9 **Emergency Diesel Generator Enclosure**
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting (Structural)	Structural Support
Cable Trays and Gutters	Structural Support
Concrete Anchors	Structural Support
Concrete Curbs	Direct Flow
Concrete Embedments	Structural Support
Concrete: Above-grade exterior (accessible)	Missile Barrier
	Shelter, Protection
	Structural Support
Concrete: Above-grade exterior (inaccessible)	Missile Barrier
	Shelter, Protection
	Structural Support
Concrete: Below-grade exterior (inaccessible)	Flood Barrier
	Shelter, Protection
	Structural Support
Concrete: Foundation (inaccessible)	Flood Barrier
	Shelter, Protection
	Structural Support
Concrete: Interior	Missile Barrier
	Shelter, Protection
	Structural Support
Conduit	Shelter, Protection
	Structural Support
Doors	Shelter, Protection
Equipment supports and foundations	Structural Support
Hatches/Plugs	Missile Barrier
	Shelter, Protection
	Structural Support
Metal components: All structural members	Structural Support
Metal decking	Structural Support
Metal panels	Shelter, Protection
Miscellaneous steel (catwalks, stairs, handrails, ladders, vents and louvers, platforms, etc.)	Filter
	Shelter, Protection
	Structural Support
Panels, Racks, Cabinets, and Other Enclosures	Shelter, Protection
	Structural Support
Penetration seals	Flood Barrier

Component Type	Intended Function
Penetration seals	Shelter, Protection
Penetration sleeves	Flood Barrier
	Shelter, Protection
	Structural Support
Roofing	Shelter, Protection
Roofing: (Scuppers)	Direct Flow
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Shelter, Protection
Seismic Gap Filler	Expansion/Separation
Tube Track	Shelter, Protection
	Structural Support

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

Table 3.5.2-9 Emergency Diesel Generator Enclosure
Summary of Aging Management Evaluation

2.4.10 Piping and Component Insulation Commodity Group

Description

The Piping and Component Insulation Commodity Group is comprised of pre-fabricated blankets, modules, panels, and sheet or bulk materials engineered to fit the piping and component surfaces to be insulated. The insulation group includes metallic and nonmetallic materials.

Metallic insulation or reflective mirror insulation is fabricated from stainless steel material. Nonmetallic insulation consists of calcium silicate, foamed plastic, fiberglass and fiberglass molded insulation, cellular glass, ceramic fiber, mineral fiber, Nukon insulation, and "Min-K" insulation. Anti-sweat insulation used on chilled water systems consists of fiberglass insulation material jacketed with stainless steel or aluminum jacketing. The fiberglass, calcium silicate and other insulation is covered with stainless steel or aluminum protective jackets which may include an integral moisture barrier. The jackets are held in-place by either stainless steel, galvanized steel or aluminum tie wire, straps, bands, fasteners, breather springs, velcro, or clips. In some cases, a protective jacket is not required. In other cases, the protective jacket may be a fabric and plastic mastic material. Wire mesh is also used for certain high temperature applications under the insulation or to cover the insulation instead of a protective jacket. The Piping and Component Insulation Commodity Group is not classified as a safety-related commodity.

The purpose of piping and component insulation is to improve thermal efficiency, minimize heat loads on the HVAC systems, provide for personnel protection, prevent freezing of heat traced piping, and protect against sweating of cold piping and components. Insulation located in areas with safety-related equipment is designed to protect nearby safety-related equipment from overheating and maintain its structural integrity during postulated design basis seismic events. Insulation within Primary Containment has been evaluated to ensure that it does not affect the emergency core cooling systems (ECCS) suction strainers. Insulation within the Primary Containment has been designed to withstand a seismic event and is classified as Seismic IIA.

Included in the boundary of the Piping and Component Insulation Commodity Group is insulation for piping and components. Piping and component insulation located inside safety-related structures, and installed on in scope piping and components located in the outdoor environment are in the scope of license renewal. The insulation, insulation jacking (includes integral moisture barrier, wire mesh, tie wires, straps, bands, breather springs, velcro, fasteners, and clips), and insulation support collars perform an intended function and are in the scope of license renewal under 10 CFR 54.4(a)(2). Insulation for the not in scope piping and components located in nonsafety-related structures is not in scope for 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 Piping and Component Insulation Commodity Group.

For more detailed information, see UFSAR Sections 5.2.3.2.4, 5.3.3.1.4.4, 5.3.3.2, 6.1.1.1.3, and 6.2.2.2 .

Reason for Scope Determination

The Piping and Component Insulation Commodity Group is not in scope under 10 CFR 54.4(a)(1) because no portions of the insulation are safety-related or relied upon to remain functional during and following design basis events. The Piping and Component Insulation Commodity Group meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the insulation could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Piping and Component Insulation Commodity Group 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. 10 CFR 54.4(a)(2)

UFSAR References

5.2.3.2.4
5.3.3.1.4.4
5.3.3.2
6.1.1.1.3
6.2.2.2

License Renewal Boundary Drawings

None

Table 2.4-10 **Piping and Component Insulation Commodity Group**
Component Subject to Aging Management Review

Component Type	Intended Function
Insulation	Thermal Insulation
Insulation (support collars and fasteners)	Shelter, Protection
	Structural Support
Insulation jacketing (includes integral vapor barrier, wire mesh, tie wires, straps, bands, clamps, fasteners, breather springs)	Shelter, Protection
	Structural Support

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

Table 3.5.2-10 Piping and Component Insulation Commodity Group
Summary of Aging Management Evaluation

2.4.11 Primary Containment

Description

The Primary Containment includes the Limerick Generating Station Unit 1 and Unit 2 Primary Containment structures, and the containment internal structures. Each Primary Containment is completely enclosed and contained within a Reactor Enclosure. The Reactor Enclosure provides the secondary containment pressure boundary, shielding, shelter and protection for the Primary Containment and the components housed within.

The Units 1 and 2 Primary Containment(s) are General Electric boiling water reactor, reinforced concrete Mark II type seismic Category I safety-related structures. The Primary Containment is a reinforced concrete structure consisting of a cylindrical suppression chamber beneath a truncated conical drywell. The conical portion of the Primary Containment (drywell) encloses the reactor vessel, reactor coolant recirculation loops, and associated components of the reactor coolant system. The drywell is separated from the wetwell, i.e., the pressure-suppression chamber and pool, by the drywell floor, also named the diaphragm slab. The suppression chamber stores a large volume of water and also contains the emergency core cooling system (ECCS) suction strainers, and the downcomer pipes which terminate below the water level. The cone and cylinder form a structurally integrated reinforced concrete vessel, lined with steel plate and closed at the top of the drywell with a steel domed head. The concrete utilizes conventional reinforcing steel and contains no prestressed tendons.

The entire Primary Containment is structurally separated from the surrounding Reactor Enclosure except at the base foundation slab (a reinforced concrete mat, top lined with a carbon steel liner plate) where a seismic gap filled with foam is provided between the two adjoining foundation slabs. The Primary Containment base foundation slab is an approximately 8 foot thick reinforced concrete mat founded on bedrock.

The purpose of the Primary Containment is to provide a high integrity barrier against leakage of any fission products associated with postulated accidents involving loss of coolant, and thereby, to limit the release of radioactive fission products to values which ensures offsite dose rates well below 10 CFR 50.67 guideline limits. It also provides a source of water for the ECCS and for pressure suppression in the event of a loss-of-coolant accident. In addition, the Primary Containment and internal structures provide structural support to the reactor pressure vessel, reactor coolant systems and other safety and nonsafety-related systems, structures, and components housed within the Primary Containment. The personnel airlock, equipment hatch and other hatches provide access to the drywell and suppression chamber. The reactor shield wall or bioshield provides the added function of radiation shielding to maintain drywell equipment qualification parameters. The concrete drywell and suppression chamber walls provide radiation shielding for areas outside of the Primary Containment.

Major systems and components in the containment include the reactor vessel, reactor coolant recirculation loops with associated components, vent pipe system (downcomers) connecting the drywell and wetwell, vacuum relief system, containment cooling system, and MSRV discharge piping with associated quencher components.

The Primary Containment consists of the following major structural components:

- Containment wall - The containment wall is constructed of reinforced concrete approximately 6 foot thick, and is lined with a carbon steel plate on the inside surface. The containment wall is reinforced with conventional reinforcing steel.

- Base foundation slab - The containment base foundation slab is approximately 8 foot thick reinforced concrete founded on bedrock. The top of the base foundation slab is lined with a carbon steel liner plate.

- Liner plate and anchorages - The carbon steel liner plate is ¼-inch thick except for areas thickened for attachments and is anchored to the concrete containment wall by structural steel members embedded in the concrete and welded to the liner plate. Loads from internal containment attachments are transferred directly into the containment concrete wall by thickening the liner plate, 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 hatches, personnel lock, suppression chamber access hatches, and CRD removal hatch). Each penetration consists of a pipe sleeve with an annular ring welded to it. The ring is embedded in the concrete wall and provides an anchorage for the penetration to resist normal operating and accident loads. The pipe sleeve is also welded to the containment liner plate to provide a leak-tight penetration.
- There are two basic types of pipe penetrations. For piping containing high temperature fluids, a sleeved penetration is furnished, providing an air gap between the containment concrete wall and the hot pipe. A steel flued head outside the containment connects the process pipe to the pipe sleeve. For piping systems containing low temperature fluid, the process pipe is welded directly to the two ends of the embedded pipe penetration. Pipe penetrations are of welded steel construction without expansion bellows, gaskets, or sealing compounds and are an integral part of the construction. Mechanical penetrations do not contain thermal insulation. Electrical penetration seal assemblies are used to extend electrical conductors through the containment. The assembly is sized to be inserted in steel penetration sleeves furnished as part of the containment. The electrical penetration seal assemblies are hermetically sealed and provide for leak testing at design pressure. Access hatches providing access into the Primary Containment are equipment hatches, personnel airlock, suppression chamber access hatches, and the control rod drive removal hatch.

- Drywell Head - The drywell head assembly consists of a hemi-ellipsoidal head and a cylindrical lower flange. The lower flange is supported on the top of the drywell wall. The head is made of steel plate and is secured with bolts at the mating flange.

- Internal Structures - The internal structures consist of reinforced concrete and structural steel and have the major functions of supporting and shielding the reactor vessel, supporting the piping and equipment, and forming the pressure-suppression boundary. These structures include the diaphragm slab, the reactor pedestal (a concentric cylindrical reinforced concrete shell resting on the containment base foundation slab and supporting the reactor vessel, the reactor shield wall), the suppression chamber columns (hollow steel pipe columns supporting the diaphragm slab), the drywell platforms, the seismic trusses, and other miscellaneous steel components.

The diaphragm slab serves as a barrier between the drywell and suppression chamber. It is a reinforced concrete circular slab approximately 3 feet, 7 inches thick. A carbon steel liner plate is provided on top of the drywell floor and anchored to it. The drywell floor is supported by the reactor pedestal, the containment wall, and twelve hollow steel pipe columns. The drywell floor is penetrated by 87 downcomers.

The reactor pedestal is an 82 feet high, upright cylindrical reinforced concrete shell that rests on the containment base foundation slab, and supports the diaphragm slab, reactor vessel, and reactor shield wall, as well as drywell platforms, pipe restraints, and recirculation pumps. Attachment of the reactor vessel to the pedestal is accomplished through a ring girder which attached to the pedestal by anchor bolts. A carbon steel form plate which acted as a concrete form during construction (which now prevents leaching of concrete into the water in the suppression pool) is provided on the inside and outside surfaces of the reactor pedestal below the diaphragm slab.

The reactor shield wall (i.e., bioshield wall) is a 49 feet high upright cylindrical shell which rests on top of the reactor pedestal and provides primary radiation shielding as well as supports for pipe restraints and drywell platforms. The reactor shield wall is constructed of inner and outer carbon steel plates and un-reinforced high density concrete between the two plates. The concrete is used for radiation shielding only and is not relied upon as a structural element.

The suppression chamber columns consist of twelve hollow steel pipe columns which support the diaphragm slab. The columns are connected to the base foundation slab at the bottom, and to the diaphragm slab at the top with embedded anchor bolts.

The drywell platforms are furnished at six elevations in the drywell to provide access and support to electrical and mechanical components. The platforms consist of structural steel framing, with steel grating and aluminum plate. Built-up box shapes are used for beams that must resist biaxial bending. Beams that span between the pedestal or reactor shield wall, and the containment wall are provided with steel to steel sliding connections at one end.

The seismic truss and the reactor vessel stabilizer provide lateral support for the reactor vessel during earthquake and pipe rupture loading. The seismic truss horizontally spans the gap between the containment wall and the reactor shield wall; the reactor vessel stabilizer spans the gap between the reactor shield wall and the reactor vessel. The seismic truss is shaped like an eight-pointed star, and is fabricated from steel plates.

Other miscellaneous internal structural components include: pipe whip restraints and crushable aluminum energy absorbers, wetwell platforms, downcomer bracing, quencher supports, equipment and piping supports, reactor shield doors and plugs, seals and gaskets, the containment seal plate, and the refueling bellows seal.

Included in the boundary of the Primary Containment are the reinforced concrete components that make up the Primary Containment and internal concrete structures. Steel elements and components in the boundary of the Primary Containment include energy absorbers, reactor pressure vessel (RPV) and reactor shield transfer girders, reactor shield, seismic stabilizer and RPV stabilizer, steel columns, downcomers and bracing, vacuum relief valves and piping, refueling bellows assembly, seal plate, debris screens, grating and bars, 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), cable trays and gutters, Service Level 1 coatings, concrete anchors and embedments, conduit, doors (reactor shield doors and plugs), electrical penetration seals, hatches and plugs, metal components (permanent drywell shielding and all structural members), miscellaneous steel, panels, racks and other enclosures, penetration sleeves, personnel airlock, equipment, CRD, and other hatches and closures, pipe whip restraints and jet impingement shields, seals and gaskets, seismic gap filler, sliding (support surfaces), tube track, 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 Containment Structure performs intended functions delineated in 10 CFR 54.4 and is in scope for license renewal in its entirely; except for the metal form decking and abandoned steel under the diaphragm slab which does not perform an intended function.

Not included in the boundary of the Primary Containment are main steam 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. These components are separately evaluated with their respective license renewal systems. That is, main steam safety relief valves and discharge lines, and quenchers are evaluated with the Main Steam System. Cranes and hoists inside the Primary Containment are separately evaluated with the Cranes and Hoists. The reactor coolant system and other mechanical or electrical systems and components housed inside the structure are separately evaluated with their respective mechanical systems, electrical systems, or commodities. Drywell and suppression chamber spray headers are evaluated with the Residual Heat Removal System and ECCS suction strainers are evaluated with the High Pressure Coolant Injection System, Reactor Core Isolation Cooling System, Core Spray System and Residual Heat Removal System. Fire barriers are evaluated with the Fire Protection System. Piping and component insulation is evaluated with the Piping and Component Insulation Commodity Group. Piping and Component supports are evaluated with the Component Supports Commodity Group.

For more detailed information, see UFSAR Sections 3.8, 3A.1.4.1, and 6.2.

Reason for Scope Determination

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).

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 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)

4. Provides a source of water for emergency core cooling systems. 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 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)

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 Environmental Qualification (10 CFR 50.49). 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 Anticipated Transients Without Scram (10 CFR 50.62). 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 Station Blackout (10 CFR 50.63). 10 CFR 54.4(a)(3)

<u>UFSAR References</u>

3.8
3A.1.4
6.2.1

<u>License Renewal Boundary Drawings</u>

LR-C-2

Table 2.4-11 Primary Containment
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting (Containment Closure)	Structural Pressure Boundary
	Structural Support
Bolting (Structural)	Structural Support
Bolting (Vacuum Relief Valve Bolting)	Structural Pressure Boundary
	Structural Support
Cable Trays and Gutters	Structural Support
Concrete Anchors	Structural Support
Concrete Embedments	Structural Pressure Boundary
	Structural Support
	Water retaining boundary
Concrete: Containment Wall (accessible areas)	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Pressure Boundary
	Structural Support
Concrete: Containment Wall (inaccessible areas)	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Pressure Boundary
	Structural Support
Concrete: Foundation (accessible): basemat	Flood Barrier
	Shelter, Protection
	Structural Pressure Boundary
	Structural Support
Concrete: Foundation (inaccessible): basemat	Flood Barrier
	Shelter, Protection
	Structural Pressure Boundary
	Structural Support
Concrete: Interior (Diaphragm Slab)	Missile Barrier
	Structural Pressure Boundary
	Structural Support
Concrete: Interior (Pedestal)	Missile Barrier
	Structural Support
Conduit	Shelter, Protection
	Structural Support
Doors (Reactor Shield Doors and Plugs)	Shielding
Downcomer Jet Deflectors	Direct Flow
	Shelter, Protection
Electrical Penetration Assembly	Shelter, Protection

Component Type	Intended Function
Electrical Penetration Assembly	Structural Pressure Boundary
Hatches/Plugs	Missile Barrier
	Shelter, Protection
	Structural Pressure Boundary
Metal components: (Permanent Drywell Shielding)	Shielding
	Structural Support
Metal components: All structural members	Structural Support
Miscellaneous steel (catwalks, stairs, handrails, ladders, platforms, etc.)	Structural Support
Panels, Racks, Cabinets, and Other Enclosures	Shelter, Protection
	Structural Support
Penetration sleeves: (includes caps for spares)	Shelter, Protection
	Structural Pressure Boundary
	Structural Support
Personnel airlock, equipment hatch, CRD hatch	Missile Barrier
	Shelter, Protection
	Structural Pressure Boundary
Personnel airlock, equipment hatch, CRD hatch: Locks, hinges, and closure mechanisms	Structural Pressure Boundary
	Structural Support
Pipe Whip Restraints and Jet Impingement Shields	Pipe Whip Restraint
	Shelter, Protection
Seals and gaskets	Structural Pressure Boundary
Seismic Gap Filler	Expansion/Separation
Service Level I Coatings	Maintain Adhesion
Sliding (support) surfaces	Structural Support
Steel Components (Energy Absorbers)	Pipe Whip Restraint
Steel Components (RPV Stabilizer)	Structural Support
Steel Components (RPV Transfer Girder and Reactor Shield Transfer Girder)	Structural Support
Steel Components (Reactor Shield)	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Support
Steel Components (Seismic Stabilizer)	Structural Support
Steel Components (Steel Columns in Suppression Pool)	Structural Support
Steel elements: diaphragm slab liner, liner anchors, integral attachments	Direct Flow

Component Type	Intended Function
Steel elements: (Refueling Bellows Assembly)	Flood Barrier
	Shelter, Protection
	Structural Support
	Water retaining boundary
Steel elements: (Seal Plate)	Flood Barrier
	Structural Support
	Water retaining boundary
Steel elements: (debris screens, grating and bars)	Filter
Steel elements: Downcomers and Bracing	Direct Flow
Steel elements: Vacuum Breaker Valves and Piping (Connected to Downcomer)	Pressure Relief
Steel elements: liner, liner anchors, integral attachments (drywell and suppression chamber accessible areas)	Structural Pressure Boundary
	Structural Support
	Water retaining boundary
Steel elements: liner, liner anchors, integral attachments (drywell and suppression chamber inaccessible areas)	Structural Pressure Boundary
	Structural Support
	Water retaining boundary
Steel elements:(Drywell Head)	Missile Barrier
	Shielding
	Structural Pressure Boundary
Tube Track	Shelter, Protection
	Structural Support

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

Table 3.5.2-11 Primary Containment
Summary of Aging Management Evaluation

2.4.12 Radwaste Enclosure

Description

The Radwaste Enclosure, which includes the offgas enclosure, contains both the liquid and gas processing portions of the Radwaste System. The Radwaste Enclosure is a multi-story structure approximately 150 feet by 199 feet in plan area with above and below grade areas. The structure is located west of the safety-related Seismic Category I Reactor Enclosure. The northern portion of the Radwaste Enclosure is located adjacent to the Turbine Enclosure which is a Seismic Category II structure. The reinforced concrete foundation slab is supported by a layer of concrete placed on top of bedrock. The exterior and bearing walls are reinforced concrete, and additionally the exterior walls below grade are waterproofed as necessary. Precast panels on this enclosure are surface facades for appearance which cover the underlying exterior reinforced concrete walls. The precast panels on this enclosure functioned as forms during construction placing of exterior wall concrete, but the precast panels do not perform an intended function and are not in scope for license renewal. The floors and roof in the main portion of the Radwaste Enclosure are constructed of reinforced concrete supported by structural steel beam and column framing systems. The floors and roof of the offgas enclosure portion of the Radwaste Enclosure are reinforced concrete supported by steel beams and bearing walls. 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. A pipe tunnel traverses the northern portion of the Radwaste Enclosure.

The Radwaste Enclosure is separated from the Reactor Enclosure and Turbine Enclosure by a seismic gap filled with rodofoam.

The Radwaste Enclosure, which includes the offgas enclosure, is a multi-story structure, separated into two sections. The eastern portion of the structure primarily contains the liquid radwaste processing portions of the Radwaste System. The western offgas enclosure portion of the building is entirely below grade and contains the offgas processing components. The western offgas enclosure portion is seismically separated from the eastern Radwaste Enclosure portion. The Chemistry Lab is a separate structure located above the offgas enclosure. The Radwaste Enclosure is constructed of reinforced concrete and structural steel.

The Radwaste Enclosure is classified as a Seismic Category IIA structure founded on bedrock and supported on a poured concrete foundation. It is designed in accordance with Seismic Category I criteria, even though it is not required to protect the integrity of the reactor coolant pressure boundary, or to ensure the capability to safely shut down the reactor, and its failure would not result in potential offsite exposures comparable to the guideline exposures of 10 CFR 50.67. The Radwaste Enclosure is located immediately adjacent to the Seismic Category I Reactor Enclosure and has been classified Seismic Category IIA and is therefore in scope for license renewal. The Radwaste Enclosure structure is tornado-resistant only to the extent of protecting the gaseous radwaste treatment system and retaining approximately 500,000 gallons of solid and liquid radwaste within the confines of the enclosure structure.

The purpose of the Radwaste Enclosure and Offgas Enclosure is to provide structural support, shelter and protection of the recovery, processing and temporary storage of radioactive waste during the operation of the plant. Additionally, the purpose of the Radwaste Enclosure is to contain any effluent accidentally spilled inside the enclosure. The radwaste tanks are located at the lowest elevation in the Radwaste Enclosure. The portions of the Radwaste System located in the Radwaste Enclosure are not in scope as these portions of the system do not have potential spatial interactions with safety-related SSCs.

Included in the boundary of the Radwaste Enclosure are concrete, metal components, and steel elements of the building, concrete anchors, curbs, and embedments, masonry walls, bolting, cable trays and gutters, conduit, doors, equipment supports and foundations, hatches, plugs, seals, gaskets, and moisture barriers, seismic gap filler, panels, racks, and other enclosures, miscellaneous steel, penetration seals, penetration sleeves, roofing, and tube track. The entire building is in scope for license renewal; except for the steel metal decking used to form floor and roof slabs, the exterior precast panels which are backed by reinforced concrete, and the waterproof membrane on the exterior below grade surfaces of the Radwaste Enclosure, which do not perform a license renewal intended function and are not in scope for license renewal. Refer to the "Components Subject to Aging Management Review" table for a complete list of components included in the boundary of the Radwaste Enclosure.

Not included in the boundary of the Radwaste Enclosure are component supports, cranes and hoists, fire barriers, and piping and component insulation, which are evaluated separately within the Cranes and Hoists, Fire Protection and Piping, Component Insulation Commodity Group and Component Supports Commodity Group.

For more detailed information, see UFSAR Section 3.8.4.1.7

Reason for Scope Determination

The Radwaste Enclosure 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 Enclosure 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 Enclosure 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. Prevent liquid radioactive waste from being released to the environment in the event of a Safe Shutdown Earthquake (SSE). 10 CFR 54.4(a)(2)

2. Provides structural support or restraint to SSCs not in scope of license renewal to prevent interaction with safety-related SSCs. 10 CFR 54(a)(2)

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(a)(2)

UFSAR References

2.2.3.2
2.4.13.3.4

3.3.2
3.8.4.1.7
3.8.5.1.4
Table 3.2-1

License Renewal Boundary Drawings

LR-C-2

Table 2.4-12 **Radwaste Enclosure**
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting (Structural)	Structural Support
Cable Trays and Gutters	Structural Support
Concrete Anchors	Structural Support
Concrete Curbs	Direct Flow
Concrete Embedments	Structural Support
Concrete: Above-grade exterior (accessible)	Shelter, Protection
	Shielding
	Structural Support
Concrete: Above-grade exterior (inaccessible)	Shelter, Protection
	Shielding
	Structural Support
Concrete: Below-grade exterior (inaccessible)	Shelter, Protection
	Structural Support
	Water retaining boundary
Concrete: Foundation (inaccessible)	Flood Barrier
	Shelter, Protection
	Structural Support
	Water retaining boundary
Concrete: Interior	Shelter, Protection
	Shielding
	Structural Support
	Water retaining boundary
Conduit	Shelter, Protection
	Structural Support
Doors	Shelter, Protection
	Shielding
Equipment supports and foundations	Structural Support
Hatches/Plugs	Shelter, Protection
	Shielding
	Structural Support
Masonry walls: Interior	Shelter, Protection
	Shielding
	Structural Support
Metal components: All structural members	Structural Support
Miscellaneous steel (catwalks, stairs, handrails, ladders, vents and louvers, platforms, etc.)	Filter
	Shelter, Protection
	Structural Support

Component Type	Intended Function
Panels, Racks, Cabinets, and Other Enclosures	Shelter, Protection
	Structural Support
Penetration seals	Shelter, Protection
	Shielding
	Water retaining boundary
Penetration sleeves	Shelter, Protection
	Structural Support
	Water retaining boundary
Roofing	Shelter, Protection
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Shelter, Protection
	Water retaining boundary
Seismic Gap Filler	Expansion/Separation
Steel elements: liner (sump), integral attachments	Water retaining boundary
Tube Track	Shelter, Protection
	Structural Support

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

Table 3.5.2-12 Radwaste Enclosure
Summary of Aging Management Evaluation

2.4.13 Reactor Enclosure

Description

The Reactor Enclosure is comprised of an integral structure divided into separate Unit 1 and Unit 2 Reactor Enclosure(s) which share a common foundation, common wall dividing the Unit 1 and Unit 2 portions, common refueling floor area, common railroad airlock, common refueling hoistway, and a common roof.

The Reactor Enclosure(s) are multistory structures having seven floor levels, with the refueling facility on the top floor level and with the emergency core cooling system (ECCS) pump rooms in the lowest elevation which are approximately 40 feet below grade. The foundation for the Reactor Enclosure(s) and Control Enclosure is a single integral unit consisting of continuous wall footings and spread column footings joined together by a continuous reinforced concrete mat which are founded on sound rock or on concrete fill placed on sound rock. The foundation mat is separated from the primary containment foundation by a seismic gap. The roof is reinforced concrete supported by structural steel girders. Exterior walls are reinforced concrete and are covered with architectural reinforced concrete precast panels primarily for appearance purposes. The floors and roof are constructed of reinforced concrete, supported by steel beam and column framing systems that are in turn supported by steel columns and reinforced concrete walls. The Reactor Enclosure is approximately 326 feet by 137 feet in plan dimension at the ground level (Units 1 and 2, excluding stacks, etc). The stacks consist of precast panels containing ducts and support steel on the north, south, east and west sides of the Reactor Enclosures for exhaust and venting. The north and south stack instrument rooms house radiation monitoring instruments and equipment and consist of metal panel and precast enclosures supported on the roof.

At certain locations 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 Enclosure(s) enclose the Primary Containment(s) and, with the common refueling floor area, provide secondary containment.

The Reactor Enclosure houses the auxiliary systems of the nuclear steam supply system (NSSS), the spent fuel pool, the refueling facility, and equipment essential to the safe shutdown of the reactor. The Reactor Enclosures are required to meet structural, as well as radiation shielding, requirements.

The purpose of the Reactor Enclosure and the refueling floor area are 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 Enclosure is designed to minimize release of airborne radioactive fission products to values which ensures offsite dose rates are well below 10 CFR 50.67 guideline limits, and to provide for controlled filtered elevated release of the reactor enclosure atmosphere under accident conditions. The Reactor Enclosure 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 Enclosure 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 Enclosure along with the Refueling Area provides Secondary Containment. This is a safety-related function. The Secondary Containment is divided into three distinct isolatable zones. Zones I and II are the Unit 1 and Unit 2 portions of the Reactor Enclosure respectively below floor Elevation 352. Zone III consists of the common Refueling Area above floor Elevation 352.

Each Reactor Enclosure (Zones I or II) completely encloses and provides Secondary Containment for its corresponding Primary Containment and reactor auxiliary or service equipment, including the Reactor Core Isolation System, Reactor Water Cleanup System, Standby Liquid Control System, Control Rod Drive System, the emergency core cooling system (ECCS), and electrical equipment components.

The common Refueling Area (Zone III) completely encloses and provides Secondary Containment for the refueling service equipment and Spent Fuel Storage facilities for Units 1 and 2.

The refueling facility or refueling floor area is located on the top elevation above the Unit 1 and 2 portions of the Reactor Enclosure. It consists of the spent fuel pool, the steam dryer and separator storage pool, the reactor well, the cask loading pit, the skimmer surge tank vaults, a 48 foot long refueling platform crane, and a 129 foot long Reactor Enclosure crane. The walls and slabs of the spent fuel pool, the cask loading pit, the reactor cavity, and the steam dryer and separator storage pool are lined on the inside with a stainless steel liner plate. The facility is supported by end bearing walls, and by two post-tensioned concrete girders with grouted tendons. The girders run east-west, and span over the Primary Containment(s).

The reactor enclosure crane consists of a main and an auxiliary hoist, with capacities of 125 tons and 15 tons, respectively. The crane is used during maintenance and refueling operations.

The Reactor Enclosure is separated from the Primary Containment by a gap filled with compressible material. A gap is also provided at the interface of the Secondary Containment with the Radwaste Enclosure and Turbine Enclosure. The south and east sides of the Reactor Enclosure are bounded by pipe tunnels which are separate structures.

The Reactor Enclosure supports the operation of the Reactor Enclosure Ventilation System by providing a structure which is capable of maintaining a negative pressure. The structure is capable of maintaining a negative pressure to prevent potential exfiltration of contaminated air during normal operations. Personnel access openings into the enclosures are provided with an interlocked double door airlock system to minimize Reactor Enclosure air leakage. Passage through any of the double door entrances can occur without loss of secondary containment integrity.

The Reactor Enclosure is provided with various types of doors which allow personnel and equipment access to and from plant compartments. The doors provide access through the following barriers: secondary containment, fire, flood (includes watertight doors), steam and air, radiation, and security. The doors may in some cases function as missile barriers. Safety-related systems and components are protected against the effects of pipe whip which might result from piping failures of high energy lines. This protection is provided by either spatial separation (compartmentalization) or pipe whip restraints. The ECCS pumps and their associated components are located in individual compartments within a Reactor Enclosure 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 Enclosure as a result of line breaks is provided by steam venting paths between the various compartments and by blowout panels leading to the outside atmosphere.

The portion of the Reactor Enclosure through which the main steam lines are routed (between the primary containment and the turbine enclosure) is referred to as the main steam tunnel and is separated from other areas of the Reactor Enclosure by concrete walls and slabs.

Included in the boundary of the Reactor Enclosure is blow out panels, bolting, cable trays and gutters, compressible joints and seals (including inflatable pool seals), concrete elements of the building, concrete anchors, curbs, concrete embedments, conduit, doors, equipment supports and foundations, hatches, plugs, masonry walls, metal components, metal panels, miscellaneous steel, panels, racks, and other enclosures, penetration seals, penetration sleeves, pipe whip restraints, precast panels, roofing and scuppers, seals, gaskets, and moisture barriers, seismic gap filler, sump liners, steel elements, and tube track. Also included in the boundary of the Reactor Enclosures 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 Enclosure are in the scope of license renewal and subject to aging management review. Except that precast panels on this enclosure are surface facades for appearance which cover the underlying exterior reinforced concrete walls. The precast panels on this enclosure except those on the north stack instrument enclosure, do not perform an intended function and are not in scope for 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 Reactor Enclosures.

Not included in the boundary of the Reactor Enclosures are the Primary Containments and associated refueling bellows, the Reactor Enclosure Ventilation System 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. These components are separately evaluated with their respective license renewal structure or system. That is, the reactor enclosure ventilation system components are evaluated with the Reactor Enclosure Ventilation System and other 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 are evaluated with the Fuel Handling and Storage System. The reactor enclosure crane and the miscellaneous cranes and hoists are evaluated with the Cranes and Hoists System. Component supports are evaluated with the Component Supports Commodity Group. Piping and component insulation is evaluated with the Piping and Component Insulation Commodity Group.

For more detailed information, see UFSAR Sections 1.2.4.2.10, 3.6.1.2.1.2, 3.8.4.1.1. 3.8.5.1.1, and 6.2.3.2.1.

<u>Reason for Scope Determination</u>

The Reactor Enclosure 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 Enclosure 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 Enclosure 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 for the discharge of treated gaseous waste to meet the requirements of 10 CFR 100. 10 CFR 54.4(a)(1)

4. Provides protection for safe storage of new and spent fuel. 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 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)

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 Environmental Qualification (10 CFR 50.49). 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 Anticipated Transients Without Scram (10 CFR 50.62). 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 Station Blackout (10 CFR 50.63). 10 CFR 54.4(a)(3)

UFSAR References

1.2.4.2.10
2.5.4.5.1
Table 2.5-9

Table 3.2-1
3.4.1.1
3.6.1.2.1.2
3.8.4

License Renewal Boundary Drawings

LR-C-2

Table 2.4-13 Reactor Enclosure
Component Subject to Aging Management Review

Component Type	Intended Function
Blowout Panels	Pressure Relief
	Shelter, Protection
Bolting (Structural)	Structural Support
Cable Trays and Gutters	Structural Support
Compressible Joints and Seals (includes Inflatable Pool Seals and Gate Seals)	Water retaining boundary
Concrete Anchors	Structural Support
Concrete Curbs	Direct Flow
Concrete Embedments	Structural Support
Concrete: Above-grade exterior (accessible)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Pressure Boundary
	Structural Support
Concrete: Above-grade exterior (inaccessible)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Pressure Boundary
	Structural Support
Concrete: Below-grade exterior (accessible)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Pressure Boundary
	Structural Support
Concrete: Below-grade exterior (inaccessible)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Pressure Boundary
	Structural Support
Concrete: Foundation (inaccessible)	Flood Barrier
	Shelter, Protection
	Structural Pressure Boundary
	Structural Support
Concrete: Interior	Flood Barrier
	HELB/MELB Shielding

Component Type	Intended Function
Concrete: Interior	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Pressure Boundary
	Structural Support
Conduit	Shelter, Protection
	Structural Support
Doors	Flood Barrier
	HELB/MELB Shielding
	Missile Barrier
	Shelter, Protection
	Structural Pressure Boundary
Equipment supports and foundations	Structural Support
Hatches/Plugs	Flood Barrier
	HELB/MELB Shielding
	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Pressure Boundary
	Structural Support
Masonry walls: Interior	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Support
Metal components: All structural members	Structural Support
Metal panels	Shelter, Protection
	Structural Support
Miscellaneous steel (catwalks, stairs, handrails, ladders, vents and louvers, platforms, etc.)	Shelter, Protection
	Structural Support
Panels, Racks, Cabinets, and Other Enclosures	Shelter, Protection
	Structural Support
Penetration seals	Flood Barrier
	HELB/MELB Shielding
	Shelter, Protection
	Shielding
	Structural Pressure Boundary
Penetration sleeves	Flood Barrier
	HELB/MELB Shielding
	Structural Pressure Boundary
	Structural Support
Pipe Whip Restraints and Jet Impingement Shields	HELB/MELB Shielding

Component Type	Intended Function
Pipe Whip Restraints and Jet Impingement Shields	Pipe Whip Restraint
Precast Panel	Shelter, Protection
Roofing	Missile Barrier
	Shelter, Protection
	Structural Pressure Boundary
	Structural Support
Roofing: (Scuppers)	Direct Flow
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Flood Barrier
	HELB/MELB Shielding
	Shelter, Protection
	Structural Pressure Boundary
Seismic Gap Filler	Expansion/Separation
Spent fuel pool gates	Water retaining boundary
Steel elements: (birdscreen)	Filter
Steel elements: Fuel pool liners, integral attachments	Structural Support
	Water retaining boundary
Steel elements: Reactor Well, Dryer and Separator Pool, and Cask Loading Pit liners, integral attachments	Structural Support
	Water retaining boundary
Steel elements: Sump liners, integral attachments	Water retaining boundary
Tube Track	Shelter, Protection
	Structural Support

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

Table 3.5.2-13 Reactor Enclosure
Summary of Aging Management Evaluation

2.4.14 Service Water Pipe Tunnel

Description

The Service Water Pipe Tunnel is a below grade reinforced concrete rectangular box section located just south of the Reactor Enclosure, and adjacent to the west wall of the Radwaste Enclosure and the east wall of the Auxiliary Boiler and Lube Oil Storage Enclosure. The north wall lies parallel to the adjacent Reactor Enclosure wall and is separated by a seismic gap. The west and east tunnel walls are separated by seismic gaps from the adjacent Radwaste Enclosure and Auxiliary Boiler and Lube Oil Storage Enclosure. The tunnel is approximately 326 feet long, 18 feet, 6 inches wide and 17 feet, 6 inches high. Its bottom slab is founded on concrete supported on bedrock. The roof slab extends to the grade level. The north side of the Emergency Diesel Generator Enclosure(s) bears on the Service Water Pipe Tunnel beneath and the access corridors to each Emergency Diesel Generator Enclosure are above the Service Water Pipe Tunnel. Watertight doors provide below grade access into the Service Water Pipe Tunnel from the adjacent Reactor Enclosure. The Service Water Pipe Tunnel is classified as a safety-related Seismic Category I structure.

The purpose of the Service Water Pipe Tunnel is to provide structural support, shelter and protection for Unit 1 and Unit 2 for the emergency service water and the residual heat removal service water piping, piping components, and supporting components.

Included in boundary of the Service Water Pipe Tunnel are reinforced concrete elements of the tunnel, bolting, cable trays and gutters, concrete anchors, concrete embedments, conduit, doors, hatches, plugs, metal components, miscellaneous steel, panels, racks, cabinets and other enclosures, penetration sleeves, penetration seals, seismic gap filler, seals and gaskets, and tube track. The Service Water Pipe Tunnel performs intended functions delineated in 10 CFR 54.4 and is in scope for license renewal in its entirely. Refer to the "Components Subject to Aging Management Review" table below for a complete list of components included in the boundary of the Pipe Tunnel.

Not included in the boundary of the Service Water Pipe Tunnel are mechanical systems and components, including piping, piping components, and valves. These components are separately evaluated with the Safety Related Service Water System and other respective mechanical license renewal systems as appropriate. Also not included in the boundary of the Service Water Pipe Tunnel are electrical commodities and component supports. Electrical commodities are evaluated with Electrical Commodities and component supports are separately evaluated with the Component Supports Commodity Group.

For more detailed information, see UFSAR Section 2.5.4.10.1.1.

Reason for Scope Determination

The Service Water Pipe Tunnel 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 Service Water Pipe Tunnel 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 Service Water Pipe Tunnel 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 Service Water Pipe Tunnel 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 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)

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 Station Blackout (10 CFR 50.63). 10 CFR 54.4(a)(3)

UFSAR References

2.5.4.10.1.1
3.4.1.1
3.6.1.2.2.7
3.8.4.1.3
9A.5.4.24
Table 2.4-1

License Renewal Boundary Drawings

LR-C-2

Table 2.4-14 Service Water Pipe Tunnel
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting (Structural)	Structural Support
Cable Trays and Gutters	Structural Support
Concrete Anchors	Structural Support
Concrete Embedments	Structural Support
Concrete: Above-grade exterior (accessible)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Structural Support
Concrete: Below-grade exterior (inaccessible)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Structural Support
Concrete: Foundation (inaccessible)	Flood Barrier
	Shelter, Protection
	Structural Support
Concrete: Interior	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Structural Support
Conduit	Shelter, Protection
	Structural Support
Doors	Flood Barrier
	Shelter, Protection
	Structural Pressure Boundary
Hatches/Plugs	Flood Barrier
	Shelter, Protection
	Structural Support
Metal components: All structural members	Structural Support
Miscellaneous steel (catwalks, stairs, handrails, ladders, vents and louvers, platforms, etc.)	Structural Support
Panels, Racks, Cabinets, and Other Enclosures	Shelter, Protection
	Structural Support
Penetration seals	Flood Barrier
	Shelter, Protection
Penetration sleeves	Flood Barrier
	Structural Support
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Flood Barrier

Component Type	Intended Function
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Shelter, Protection
Seismic Gap Filler	Expansion/Separation
Tube Track	Shelter, Protection
	Structural Support

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

Table 3.5.2-14 Service Water Pipe Tunnel
Summary of Aging Management Evaluation

2.4.15 Spray Pond and Pump House

Description

The Spray Pond and Pump House include the Spray Pond and the Spray Pond Pump House which is also known as the Spray Pond Pump Structure.

Spray Pond

The Spray Pond is an excavated below-grade pond sized for a water volume adequate for cooling under design basis conditions and designed to satisfy Seismic Category I requirements. The Spray Pond is comprised of the excavated Spray Pond, spray network piping and reinforced concrete supports, reinforced concrete overflow weir structure, reinforced concrete intake area slab, and an earthen emergency spillway. The Spray Pond Pump House structure along the southern edge of the Spray Pond is evaluated under a separate heading below.

The Spray Pond is located about 500 feet north of the cooling towers, which are also well north of the powerblock. The pond is comprised of a 600 feet by 400 feet excavated rectangular midsection at the bottom of the pond, with a semicircle radius equal to 200 feet on each side at the bottom of the pond which then slopes up and outward to grade. The water stored in the Spray Pond is approximately 10 feet deep. The Spray Pond system is common to both Limerick Generating Station Units 1 and 2.

The Spray Pond is constructed primarily by excavation. The foundations for the Spray Pond Pump House, overflow structure, and spray network pipe supports were excavated to unweathered bedrock. Due to the slope of the bedrock upper surface, the bottom of the pond below the soil-bentonite liner is founded partially on soil and partially on rock.

A soil-bentonite liner and a protective soil cover are placed over the entire bottom of the pond and on the soil slopes. The soil cover on the slopes in turn is protected by riprap and riprap bedding. The rock slopes are treated by shotcrete for protection against weathering. Rock bolts were also installed at some locations in the rock slopes as an added stability measure.

An emergency spillway is provided at the north side of the pond. The emergency spillway is designed to ensure that the maximum water level does not adversely affect the spray pond system and to direct run-off water away in a controlled manner.

A roadway is provided around the perimeter of the Spray Pond. The roadway facilitates access to and maintenance of the Spray Pond.

The soil-bentonite lining and soil cover, riprap and riprap bedding shotcrete, rock bolts, and roadwork are not safety-related. Although the soil-bentonite liner, soil cover, shotcrete, rip-rap and rip-rap bedding are noted as not safety-related in the UFSAR, they are included and enveloped by the earthen water-control structure embankment component and the soil, rip-rap, gravel material which are addressed by the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program and do not need to be called out and addressed as separate components and materials. The shotcrete is a non-structural coating intended to protect rock faces from weathering.

The Spray Pond is provided with an overflow weir as part of the overflow structure to accommodate normal water level fluctuations, and a safety-related emergency spillway comprised of soil and rock to limit the maximum water level in the pond during maximum precipitation conditions. The earthen emergency spillway also supports the bituminous concrete perimeter roadway and a bituminous concrete access apron.

Four piping spray networks which are arranged symmetrically above the pond water level, provide cooling for the emergency service water and residual heat removal service water return water. The networks and their supply piping are suspended above water on reinforced concrete columns which are founded on bedrock or on concrete fill placed on bedrock. The residual heat removal service water and emergency service water systems receive cooling water from the Spray Pond via the Spray Pond Pump House located on the pond perimeter, and return the water to the Spray Pond via the spray networks, or winter bypass lines. Makeup water to the pond is supplied via a branch line from the Schuylkill River makeup line to the cooling towers. Makeup to the spray pond is controlled manually.

The Spray Pond is classified as safety-related and Seismic Category I and is designed to withstand the most severe natural phenomenon or site-related event (e.g., SSE, tornado, hurricane, flood, freezing, or transportation accident) without impairing its safety function.

The purpose of the Spray Pond is to provide the Ultimate Heat Sink (UHS) for both units that ensures that an adequate source of cooling water is available at all times for reactor shutdown, cooldown, and for accident mitigation.

Spray Pond Pump House

The Spray Pond Pump House (also known as the Spray Pond Pump Structure) is a two-story reinforced concrete structure approximately 46 feet by 151 feet in plan located on the south edge of the Spray Pond. The Spray Pond Pump House foundation was excavated to and placed on unweathered bedrock. The Spray Pond Pump House is comprised of reinforced concrete foundation slab and walls, steel floor and roof beams, and other miscellaneous structural and platform steel. A mezzanine floor composed of grating over steel beams is provided to support the heating and ventilating equipment. An intermediate floor in the wing areas is provided to support valves and piping. The outer walls are covered with an architectural facade comprised of reinforced concrete precast panels for appearance which are not safety-related. The roof is a reinforced concrete slab covered with a built-up elastomer membrane roofing.

The Spray Pond Pump House is designed to protect the enclosed portion of the Safety Related Service Water System piping, pumps, and related vital components and provide access to the Spray Pond UHS cooling water under postulated environmental and design basis accident loadings, and is classified safety-related and Seismic Category I.

Equipment housed within the Spray Pond Pump House includes the emergency service water (ESW) pumps and motors, residual heat removal service water (RHRSW) pumps and motors, ESW and RHRSW valves and operators and associated piping, and electrical and control panels, sluice gates and fixed screens. The Spray Pond Pumphouse structure also houses and supports nonsafety-related equipment including cranes and hoists.

Openings are provided in front of the structure to allow pond water to flow into the wet pits where the pump suction openings are located. Closure of the sluice gates on these openings, and realignment of system valves allows the Safety Related Service Water System to be operated in different modes.

The wet pit area is divided into two sections, corresponding to the A and B loops of the plant residual heat removal service water and emergency service water plant systems. The two areas are separated by a wall with a sluice gate that can be closed to isolate the two trains. Each pump is installed in its own bay. A removable screen is placed at the entrance of each bay. Trash racks are not included or required in the design of the Spray Pond Pump House. The Spray Pond Pump House also contains two RHRSW and ESW pipe-ways and two RHRSW valve compartments. Each pump-room contains two RHRSW pump motors and two ESW pump motors. The pumps are common to both Unit 1 and Unit 2.

Chemical injection skids located near at the Spray Pond Pump House provide chemical treatment of the Spray Pond Pump House wet wells through the use of biocide and scale inhibitor chemicals.

The purpose of the Spray Pond Pump House is to provide structural support, shelter and protection, and access to Spray Pond water for the RHRSW and ESW pumps, and associated piping, valves and related equipment which are included with the Safety Related Service Water System under postulated environmental and design basis accident loading conditions.

Included in the boundary of the Spray Pond and determined to be in scope for license renewal are earthen water control structures (embankments, rock, and emergency spillway), concrete elements including concrete foundations, concrete columns supports for spray network piping, concrete pipe encasement, metal components, concrete embeds, concrete overflow structure (concrete, embeds, weir plate, and screen), intake area concrete slab, and seals, gaskets and moisture barriers.

Included in the boundary of the Spray Pond Pump House structure and determined to be in scope for license renewal are reinforced concrete elements of the structure, roofing and roofing scuppers, doors, metal components (includes structural steel), miscellaneous steel, structural bolting, concrete anchors, concrete embedments (includes sluice gate wall thimble), penetration sleeves, penetration seals, conduit, cable trays and gutters, panels, racks, cabinets and other enclosures, hatches, plugs, screens, splitter assembly (vortex suppressors), equipment supports and foundations, tube track, seals, gaskets and moisture barriers, and seismic gap filler.

Refer to the "Components Subject to Aging Management Review" table below for a complete list of components included in the boundary of the Spray Pond and Pumphouse structures.

Included in the boundary of the Spray Pond Pump House structure and determined not in scope for license renewal are the active sluice gates and operators which are subject to periodic testing, retaining walls on either side and just south of the Spray Pond Pumphouse, and metal decking (concrete slab construction form). Precast panels on this enclosure are surface facades for appearance which cover the underlying exterior reinforced concrete walls. The precast panels do not perform an intended function and are not in scope for license renewal. These components are active, or are provided for construction, appearance or maintenance activities. They do not perform a license renewal intended function and their failure does not prevent satisfactory accomplishment of a safety-related function.

Included in the boundary of the Spray Pond structure and determined not in scope for license renewal are the roadwork and the bituminous concrete apron in the emergency spillway area. These components are not Seismic Category I nor safety-related. The roadwork is provided to facilitate access and maintenance. The bituminous concrete apron in the spillway area is an extension of the road to facilitate maintenance watercraft access. These components do not perform a license renewal intended function and their failure will not prevent satisfactory accomplishment of a safety-related function.

Not included in the boundary of the Spray Pond and Pump House structures are cranes and hoists, fire barriers, and components supports. Cranes and hoists are evaluated separately with the Cranes and Hoists system, fire barriers are evaluated separately with the Fire Protection System, and the component supports are evaluated with the Component Supports Commodity Group. Components also not included in the boundary of the Spray Pond and Pumphouse structures are the mechanical components for the RHRSW and ESW Systems, including the spray network piping and nozzles which are evaluated with the license renewal Safety Related Service Water System.

For more detailed information, see UFSAR Sections 3.8.4.1.4, 3.8.4.1.5, and 9.2.

<u>Reason for Scope Determination</u>

The Spray Pond and Pump House 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 Spray Pond and Pump House 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 Spray Pond and Pump 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 Spray Pond and Pump 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 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 (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 (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 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

2.4.8.1
3.8.4
9.2.6
Table 2.5-9

License Renewal Boundary Drawings

LR-C-2

Table 2.4-15 Spray Pond and Pump House
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting (Structural)	Structural Support
Cable Trays and Gutters	Structural Support
Concrete (Concrete Pipe Encasement)	Shelter, Protection
	Structural Support
Concrete Anchors	Structural Support
Concrete Embedments	Structural Support
Concrete Embedments (Sluice Gate Wall Thimble)	Structural Support
	Water retaining boundary
Concrete: (Intake Area Slab)	Direct Flow
	Water retaining boundary
Concrete: (Overflow Structure)	Direct Flow
	Structural Support
	Water retaining boundary
Concrete: Above-grade exterior (accessible)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Structural Support
Concrete: Above-grade exterior (inaccessible)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Structural Support
Concrete: Below-grade exterior (inaccessible)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Structural Support
	Water retaining boundary
Concrete: Columns (Spray Network Supports)	Structural Support
Concrete: Foundation (accessible)	Flood Barrier
	Shelter, Protection
	Structural Support
	Water retaining boundary
Concrete: Foundation (inaccessible)	Flood Barrier
	Shelter, Protection
	Structural Support
	Water retaining boundary
Concrete: Foundation (inaccessible) (Spray Network Supports)	Structural Support
Concrete: Interior	Flood Barrier

Component Type	Intended Function
Concrete: Interior	Missile Barrier
	Shelter, Protection
	Structural Support
	Water retaining boundary
Conduit	Shelter, Protection
	Structural Support
Doors	Shelter, Protection
Earthen water-control structures: (Emergency Spillway)	Water retaining boundary
Earthen water-control structures: Embankments (dikes, include rock covered with shotcrete)	Water retaining boundary
Equipment supports and foundations	Structural Support
Hatches/Plugs	Missile Barrier
	Shelter, Protection
	Structural Support
Metal components: (Removable Screens and Screen Frames)	Filter
Metal components: All structural members	Structural Support
Metal components: Weir Plate	Water retaining boundary
Miscellaneous steel (Splitter Assembly - vortex suppressors)	Direct Flow
Miscellaneous steel (catwalks, stairs, handrails, ladders, vents and louvers, platforms, etc.)	Filter
	Shelter, Protection
	Structural Support
Panels, Racks, Cabinets, and Other Enclosures	Shelter, Protection
	Structural Support
Penetration seals	Flood Barrier
Penetration sleeves	Structural Support
Roofing	Shelter, Protection
Roofing: (Scuppers)	Shelter, Protection
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Shelter, Protection
	Water retaining boundary
Seismic Gap Filler	Expansion/Separation
Tube Track	Shelter, Protection
	Structural Support

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

Table 3.5.2-15 Spray Pond and Pump House
Summary of Aging Management Evaluation

2.4.16 Turbine Enclosure

Description

The Turbine Enclosure includes the extensions at the 5, 23, and 41 plant location identifier lines.

The Turbine Enclosure is divided into two units with a common operating floor. The Turbine Enclosure is a steel framed and reinforced concrete structure enclosed with precast concrete panels above grade which is located immediately north of the other powerblock enclosures (Radwaste Enclosure, Reactor Enclosure, and Control Enclosure). Seismic separation gaps are provided at the interface of the Turbine Enclosure with the Reactor, Control, and Radwaste enclosures.

The Turbine Enclosure is a multi-story structure approximately 170 feet by 630 feet in plan area comprised of structural steel framing, precast concrete panels, masonry walls, and reinforced concrete walls, floor slabs, foundation footings, foundation mat, and roof. The reinforced concrete footings and foundation mat are supported on bedrock. The Turbine Enclosure houses two inline turbine-generator units and auxiliary equipment including condensers, condensate pumps, moisture separators, air ejectors, feedwater heaters, reactor feed pumps, motor generator sets for reactor recirculation pumps, interconnecting piping and valves, switchgear, and heating and ventilating equipment.

The Turbine Enclosure includes the areas also known as Turbine Auxiliary Bays which are integral parts of the Turbine Enclosure structure. The Turbine Enclosure also includes the commercial grade extensions or building additions that have been added at the north, east and west sides of the Turbine Enclosure to facilitate personnel access and accommodation and also to provide for additional storage. These additions are also known as the 5, 23, and 41 line extensions. The Turbine Enclosure is maintained under a negative pressure by the turbine enclosure ventilation system which is included with the Miscellaneous Ventilation System to prevent potential exfiltration of contaminated air from the Turbine Enclosure during operations. The structure is also provided with blowout panels and a vent stack for pressure relief as well as blowout panels for internal flood relief. Curbs, weirs and other features are also provided for flood protection. Three 110 ton overhead cranes are provided above the operating floor for servicing both turbine-generator units. Two reinforced concrete tunnels, one for each unit, are provided for the offgas pipelines at the foundation level, running from the area around the control structure to the radwaste enclosure. Exterior walls above grade are covered by nonstructural precast reinforced concrete panels. Interior walls required for radiation shielding or fire protection are constructed of reinforced concrete or reinforced masonry walls. The turbine-generator units are supported on freestanding reinforced concrete pedestals. Separation joints are provided between the pedestals, and the turbine enclosure floors and walls, to prevent transfer of vibration to the enclosure. The operating floor of the turbine enclosure is supported on vibration damping pads at the top edge of the pedestal. The built up roof is supported by metal decking and steel framing.

The seismic Category II nonsafety-related Turbine Enclosure may undergo some deformation under seismic loading; however, the structure is designed to maintain its integrity under the seismic loading resulting from the safe shutdown earthquake (SSE) to ensure that safety-related main steam, and other in scope system components will be capable of performing their functions during and following an SSE. The Turbine Enclosure was also designed to ensure the capacity to withstand a SSE without collapsing on or impairing the integrity of the adjacent Reactor and Control enclosures.

Three commercial grade extensions or additions which are commonly known as the 5, 23, and 41 line extensions are supported by reinforced concrete slabs on grade and are located at the north, east and west sides of the Turbine Enclosure to facilitate personnel access and accommodation and also to provide for additional storage. These extensions or additions do not provide an intended function for license renewal and are therefore, not in scope.

Within the Turbine Enclosure a number of small commercial grade panel enclosures have been added as office areas for support personnel or as equipment storage enclosures. These miscellaneous enclosures within the Turbine Enclosures do not support or perform an intended function for license renewal and are therefore, not in scope.

The purpose of the Turbine Enclosure 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 Enclosure contains steam and power conversion systems components and the support systems and components necessary to support Fire Protection, Station Blackout, and Anticipated Transients Without Scram.

Included in the boundary of the Turbine Enclosure are reinforced concrete elements of the building, precast concrete panels, metal decking, conduit, cable trays and gutters, concrete anchors, concrete embedments, curbs, masonry walls, doors, hatches, plugs, seismic gap filler, blowout panels, equipment supports and foundations, expansion or control joints, panels, racks, and other enclosures, metal components, steel elements, metal panels and decking, roofing (scuppers), sliding support surfaces, miscellaneous steel, bolting, penetration sleeves, penetration seals, built up roofing, seals, gaskets and moisture barriers, and tube track. The Turbine Enclosure is in scope for license renewal in its entirety except that the Turbine Enclosure extensions or additions on the north, east and west sides of the Turbine Enclosure (5, 23, and 41 lines); and the miscellaneous small personnel and storage enclosures within the Turbine Enclosure 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 Enclosure.

Not included in the boundary of the Turbine Enclosure are cranes and hoists, fire barriers, piping and component insulation, and component supports. Piping and component insulation are evaluated separately with the Piping and Component Insulation Commodity Group. Cranes and hoists are evaluated separately with the Cranes and Hoists system, fire barriers are evaluated separately with the Fire Protection System, and the component supports are evaluated with the Component Supports Commodity Group.

For more detailed information, see UFSAR Section 3.8.4.1.8.

Reason for Scope Determination

The Turbine Enclosure 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 Enclosure 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 Enclosure 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 Enclosure 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 structural support or restraint to SSCs in scope of license renewal. 10 CFR 54.4(a)(2)

2. 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)

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 Anticipated Transient Without Scram (10 CFR 50.62). 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

2.5.4.10
Table 3.2-1
3.3.2.3
3.4.1.1
3.6.1.2.1.17
3.7.2.8
3.8.4.1.8
3.8.5.1.5

License Renewal Boundary Drawings

LR-C-2

Table 2.4-16 <u>Turbine Enclosure</u>
Component Subject to Aging Management Review

Component Type	Intended Function
Blowout Panels	Pressure Relief
Bolting (Structural)	Structural Support
Cable Trays and Gutters	Structural Support
Concrete Anchors	Structural Support
Concrete Curbs	Flood Barrier
Concrete Embedments	Structural Support
Concrete: Above-grade exterior (accessible)	Flood Barrier
	Shelter, Protection
	Structural Support
Concrete: Above-grade exterior (inaccessible)	Flood Barrier
	Shelter, Protection
	Structural Support
Concrete: Below-grade exterior (inaccessible)	Flood Barrier
	Shelter, Protection
	Structural Support
Concrete: Foundation (inaccessible)	Flood Barrier
	Shelter, Protection
	Structural Support
Concrete: Interior	Flood Barrier
	Shelter, Protection
	Shielding
	Structural Support
Conduit	Shelter, Protection
	Structural Support
Doors	Flood Barrier
	Shelter, Protection
Equipment supports and foundations	Structural Support
Expansion Joint	Expansion/Separation
Hatches/Plugs	Shelter, Protection
	Shielding
	Structural Support
Masonry walls: Interior	Shelter, Protection
	Shielding
	Structural Support
Metal components: All structural members	Structural Support
Metal decking	Shelter, Protection
	Structural Support
Metal panels	Shelter, Protection
	Shielding

Component Type	Intended Function
Metal panels	Structural Support
Miscellaneous steel (catwalks, stairs, handrails, ladders, vents and louvers, platforms, etc.)	Shelter, Protection
	Structural Support
Panels, Racks, Cabinets, and Other Enclosures	Shelter, Protection
	Structural Support
Penetration seals	Flood Barrier
	Shelter, Protection
Penetration sleeves	Flood Barrier
	Structural Support
Precast Panel	Flood Barrier
	Shelter, Protection
Roofing (Built Up Roofing)	Shelter, Protection
Roofing: (Scuppers)	Direct Flow
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Flood Barrier
	Shelter, Protection
Seismic Gap Filler	Expansion/Separation
Sliding (support) surfaces	Structural Support
Steel elements: (Birdscreen)	Filter
Steel elements: Sump liners, liner anchors, integral attachments	Water retaining boundary
Tube Track (instrument tray or raceway)	Shelter, Protection
	Structural Support

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

Table 3.5.2-16 Turbine Enclosure
Summary of Aging Management Evaluation

2.4.17 Yard Facilities

Description

The Yard Facilities include the tank foundations and dikes, trenches, light poles, transmission towers, fire hose cart and storage cart foundations, manholes, valve pits and duct banks, railroad bridge, transformer foundations and dikes, yard drainage system, miscellaneous yard structures, and meteorological towers.

Tank Foundations and Dikes:

The tank foundations and dikes consist of the refueling water storage tank (RWST) foundation, the LGS 1 and LGS 2 condensate storage tanks (CST) and associated dikes, fuel oil storage tank and dike, clarified water tank foundation, demineralized water tank foundation, neutralization tanks foundation, backup fire water storage and gas storage pad, and domestic water tank foundation and storage pad.

The Unit 1 condensate storage tank and refueling water storage tank foundation and dike area contains both the Unit 1 condensate storage tank and the common refueling water storage tank. The tank foundations and the common dike are located on the west side of the power block. The earthen dike is connected to a reinforced concrete wall located above the underground portion of the Radwaste Enclosure. The tanks are supported on concrete pads. The tank bottoms are supported by a layer of bituminous sand on top of structural backfill. The tanks are surrounded by a built-up earthen dike. The dike walls and dike floor area are covered with a bituminous surface. The Unit 2 condensate storage tank foundation and dike are located south of the powerblock. The dike areas also contain pipe trenches as described below. The failure of the refueling water storage tank and condensate storage tanks are designed to be entirely contained within the dike and would not impact a safety-related function of the surrounding structures. The purpose of these dikes is to contain effluent within the diked area so that it does not reach any source of surface waters. The tank foundations for the Unit 1 and LGS 2 condensate storage tanks and the common refueling water storage tank do not perform an intended function and are not in scope for license renewal. The earthen dikes surrounding the Unit 1 CST and RWST tanks and the Unit 2 CST tank are classified as Seismic category IIA and are in scope for license renewal.

The fuel oil storage tank for the Auxiliary Boiler is located south of the power block. The tank bottom is supported by a layer of bituminous sand on top of reinforced concrete pad, on rock. The area within the dike is covered with a bituminous surface. The tank foundation for the secondary auxiliary boiler fuel oil storage tank is not used as no tank is installed on that foundation. The structures are separated from safety-related systems, structures, and components such that their failure would not impact a safety-related function. The fuel oil storage tank dike which is common with the Unit 2 CST tank dike is in scope for Fire Protection and evaluated separately within the Fire Protection System.

The clarified water tank and the demineralized water tank, consist of concrete slabs on grade. The clarified water tank and demineralized water tanks are located north of the LGS 2 turbine building and power block. They are separated from safety-related systems, structures, and components (SSCs) such that their failure would not impact a safety-related function. There is a concrete pipe tunnel located on the eastern end of the foundation pad allowing process piping to connect between the tanks and the water treatment enclosure. The clarified water and demineralized water tanks and foundations and curb wall do not perform an intended function and are therefore, not in scope of license renewal.

The neutralization storage tanks foundation and dike is a reinforced concrete structure located north of the Unit 2 portion of the Turbine Enclosure and separated from safety-related systems, structures, and components (SSCs) such that its failure would not impact a safety-related function. This foundation and dike is south of the demineralized water tank foundation. There is a concrete pipe tunnel located on the eastern end of the foundation pad allowing process piping to connect between the storage tanks foundation and dike to allow process piping to connect between the tanks and the water treatment enclosure. The neutralization storage tanks foundation and dike does not perform an intended function and is therefore, not in scope for license renewal.

The backup fire water storage tank foundation is a reinforced concrete structure located north-east of Unit 2 cooling tower and is separated from safety-related systems and components (SSCs) such that its failure would not impact a safety-related function. The backup fire water storage tank foundation performs an intended function by supplying makeup water to the secondary backup fire pump and is therefore in scope for license renewal.

The domestic water tank foundation is a reinforced concrete structure located east of Unit 2 cooling tower and is separated from safety-related systems, structures, and components (SSCs) such that its failure would not impact a safety-related function. The domestic water tank foundation does not perform an intended function and is therefore, not in scope of license renewal.

The gas storage pads are comprised of nitrogen tank storage tank and foundation pads, and other gas storage pads. The nitrogen storage tanks and concrete pads are located at grade south of the Radwaste Enclosure. The gas storage pads are in the yard just south of the warehouse portion of the Admin Building Shops and Warehouse and include bottle barriers for tank restraint and storage. The nitrogen tank foundation pads and gas storage pads are not safety-related and separated from safety-related systems, structures, and components such that their failure would not impact a safety-related function. The gas storage pads do not perform an intended function and are therefore, not in the scope of license renewal.

Trenches:

Trenches are a below grade reinforced concrete enclosure with a concrete top cover or with metal plates. The trenches in the yard area are located in the condensate storage tank and refueling water tank area (both shallow and deep trench pipe ways), between the circulating water chlorine and acid feed buildings and the cooling towers, and just outside the water treatment enclosure. The trenches are used to route certain nonsafety-related piping (condensate storage and refueling water, chlorine and acid chemical piping, clarified and demineralized water and neutralization water piping) below the grade to adjacent structures. The top of the trenches are located at approximately grade level. The trenches do not perform an intended function and are therefore, not 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 for safe movement of personnel 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 are metal structures supported by reinforced concrete foundations located in the yard. The transmission towers provide support for high voltage electrical cables which connects LGS to local switchyards. Some towers provide essential power for normal plant and emergency operations. The transmission towers for the 220 kV to 500 kV tie line provide an intended function and therefore, are in the scope for license renewal.

Fire Hose Cart and Storage Cart foundations:

The fire hose cart and storage foundation pads are reinforced concrete pads on grade and provide level support for the storage of outdoor fire hose and fire fighting equipment. These foundations are located around the perimeter of the power block and throughout all the yard structures. The fire hose cart and storage foundation pad do not perform an intended function and are therefore, not in scope of license renewal.

Manholes, Valve Pits and Duct Banks:

Manholes and valve pits consist of reinforced concrete structures buried underground with a reinforced concrete panel on top. The manholes have a removable opening cover to allow plant personnel access. Manholes and valve pits serve as intermediate access point(s) for electrical cable and piping routed in the yard area and for access to valves for buried pipe. There are safety-related and nonsafety-related manholes and valve pits located in the yard area.

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 the safety-related and nonsafety-related cables between structures and also in the switchyard areas.

The safety-related manholes, valve pits and duct banks as well as, the electrical manholes for station blackout perform an intended function and are therefore, in the scope for license renewal.

Railroad Bridge:

The Railroad Bridge is located south of the power block and outside the protected area. The Railroad Bridge is constructed of structural steel with a concrete deck. The two bridge footings and two bridge abutments are reinforced concrete. The Railroad Bride supports a 13.2 kV line that is relied on to perform an intended function to provide offsite power. The bridge decking is concrete with stone and timber bedding supporting the tracks. A 13 kV cable tray is located below and supported by the bridge structure. Other features of the bridge, such as rails, ballast, ties do not support the intended function of the Railroad Bridge. The Railroad Bridge structure performs an intended function and is therefore, in scope for license renewal.

Transformer foundations and dike:

The transformer foundations (including spare transformers) consist of reinforced concrete slabs with block or concrete walls to form a dike which provides for structural support and leak containment. These foundations and dikes are located in the yard north of the power block. The foundations are founded on soil fill. Most of the transformer foundations do not perform a safety-related function and are away from SSCs such that their failure would not impact safety-related function. The dike walls and separator walls for the main transformers perform a fire protection function and are therefore, in scope for license renewal. The safeguard transformers that are required to support Station Blackout are used to supply safety related equipment during normal and emergency plant operating conditions. These foundations and dikes perform an intended function and are therefore, in scope for license renewal.

Yard Drainage System:

The yard drainage system includes both the storm drain system and normal waste drain system. The storm and normal waste drainage systems are comprised of buried reinforced concrete pipe, polyethylene or cast iron pipe. It also contains at grade reinforced concrete catch basins and oil interceptor pits and tanks. The catch basins 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 to the Schuylkill River via the holding pond. The storm drainage system is provided to drain the station's yard area during normal conditions. The yard drainage system does not perform an intended function and is not in scope for license renewal.

Miscellaneous Yard Structures:

The miscellaneous yard structures include the vehicle fueling facility, Independent Spent Fuel Storage Installation (ISFSI), weld test shop (formerly known as the iron workers shop), nuclear maintenance division (NMD) shop (formerly known as the operating engineers (O.E). shop), waste water settling basin, new toilet facilities, sewage treatment facilities, holding pond and treatment building, backup fire pump house and foundation, site well number 3 enclosure and miscellaneous commercial yard enclosures.

The vehicle fueling facility contains underground fuel tanks with above ground filling station. The fueling facility is located north of the cooling towers. The vehicle fueling station and tanks are located outside the controlled area of LGS. This structure is separated from safety-related systems, structures, and components such that its failure would not impact a safety-related function. The vehicle fueling facility does not perform an intended function and is therefore, not in scope for license renewal.

Independent Spent Fuel Storage Installation contains the spent fuel for storage in individual above ground fuel vaults. The ISFSI is west of the powerblock. 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 NMD shop and weld test shop are small single story commercial grade steel structures, founded on reinforced concrete pads. These facilities are located north of the cooling towers. They are used for outage support and as a weld test and assembly facilities. These structures are separated from safety-related systems, structures, and components such that their failure would not impact a safety-related function. The NMD shop and weld test shop do not perform an intended function and are therefore, not in scope for license renewal.

The waste water settling basin is an above ground segmented tank to process yard drainage water prior into release to the storm drainage system. The waste settling basin is located south-west of the Kemper building (formerly known as the PECO Office Building) and north of the power block. This structure is separated from safety-related systems, structures, and components such that its failure would not impact a safety-related function. The waste water settling basin does not perform an intended function and is therefore, not in scope for license renewal.

The new toilet facility is a commercial, single semi-permanent mobile structure mounted on blocks west of the power block. This structure is used as a waste collection facility for use by temporary outage personnel. This structure is separated from safety-related systems, structures, and components such that its failure would not impact a safety-related function. The new toilet facility does not perform an intended function and is therefore, not in scope for license renewal.

The sewage treatment facility was used to process station waste products for treatment and disposal prior to release. This facility is south of the power block and outside of the protected area. The facility includes the aerated holding tanks and the sewage treatment and settling tanks. This facility is no longer used and has been isolated from service and replaced with a permanent tie line which connects to the local off-site municipality waste treatment facilities. This structure is separated from safety-related systems, structures, and components such that their failure would not impact a safety-related function. The idled sewage treatment facility structure and the underground connection to the municipality waste treatment facility do not perform an intended function and are therefore, not in scope for license renewal.

The holding pond and treatment building is a small commercial building and concrete lined pond which is located south of the power block. This structure is currently used to process and hold normal waste and storm water prior to release. It is nonsafety-related and separated from safety-related systems, structures, and components such that their failure would not impact a safety-related function. The holding pond and treatment building does not perform an intended function and is therefore, not in scope for license renewal.

The backup fire pump house and foundation is a metal enclosure on a concrete slab on rock. This structure includes a fuel oil tank and is located outside the protected area and east of the power block. The foundation supports the back-up third fire pump and equipment that can be placed in service as stated in the technical requirements manual basis. The back-up fire pump house and foundation is required for the Fire Protection System and is therefore, in scope for license renewal.

The site well number 3 structure is a small commercial building located in the far north-east corner of the plant property. This structure is outside of the protected area but within the owner controlled area. This structure is used to house the number 3 deep well pump and controls which supplies water to the backup fire water storage tank. The reinforced concrete slab and metal structure for site well number 3 performs an intended function for the Fire Protection System and is therefore, in scope for license renewal.

Miscellaneous yard structures are comprised of civil features located in the yard area that are not uniquely tied to any structure in the yard. These miscellaneous yard structures include roadways, sidewalks, bollards, reinforced concrete foundation slabs for buildings that have been removed from the site, concrete pads for commercial grade HVAC units for office buildings, abandoned concrete equipment foundations, helicopter pad, and miscellaneous yard sheds and foundations. 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 except for the back-up fire pumphouse and site well number 3 enclosure which are in scope, do not perform an intended function and are therefore, not in scope for license renewal.

Meteorological Towers:

The meteorological towers include the two meteorological towers and their supporting equipment sheds. Tower number 1 is located approximately 3000 feet, north-north-west of the power block and is approximately 281 feet tall. Tower #2 is located 2000 feet west of the power block and across the Schuylkill River and is approximately 314 feet tall. Both of the meteorological towers are guy wire supported steel towers founded on a concrete foundation. The equipment enclosures are both commercial grade metal enclosures on a concrete foundation. The meteorological towers are nonsafety-related and separated from safety-related systems, structures, and components such that their failure would not impact a safety-related function. The purpose of the meteorological towers 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 towers do not perform an intended function for license renewal and are therefore, not in the scope of license renewal.

The purpose of the Yard Facilities is to provide structural support, shelter, and protection for safety-related and nonsafety-related components and commodities including components credited for Fire Protection, and Station Blackout. Dikes surrounding condensate storage and refueling water storage tanks are designed to contain and prevent radioactive effluent from reaching the surface waters. The yard drainage system provides for collection and processing system is used to collect and treat waste water prior to release to the Schuylkill River.

Included in the boundary of the Yard Facilities are tank foundations, dikes, trenches, light poles, fire hose cart and storage cart foundations, manholes, valve pits, duct banks, railroad bridge, transformer foundations, transmission towers, miscellaneous yard structures, meteorological towers, and the yard drainage system. Included in the boundary of Yard Facilities and determined to be in scope are the backup fire water storage tank foundation, safety related manholes and valve pits, station blackout related manholes, duct banks, transmission towers, railroad bridge, safeguard transformer dike and foundations, dikes and separator walls for the main transformers, site well number 3 structure, earthen dike around the condensation storage tanks, and the backup fire pump house foundation. The components included in scope are reinforced concrete elements, structural bolting, cable trays and gutters, concrete anchors, concrete curbs, concrete embedments, above and below grade concrete walls, foundations, conduit, doors, duct banks, equipment supports and foundations, hatches and plugs (including manhole covers), masonry walls, metal components, metal siding, miscellaneous steel, panels, racks, cabinets and other enclosures, penetration seals and sleeves, seismic gap filler, seals, gaskets and moisture barriers, steel components, and tank dikes. The other structures and components 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 Facilities are component supports, tanks, piping and component insulation, security structures, fire protection, buried piping and piping components in the valve pits, and the 220kV and 500 kV substations. Component supports are separately evaluated with the Component Supports Commodity Group. The tanks are evaluated with their respective mechanical system. The piping and component insulation is evaluated with the Piping and Component Insulation Commodity 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 220 and 500 kV switchyards and certain transmission towers are evaluated with the 220 and 500 kV Substations enclosure package.

For more detailed information, see UFSAR Section 3.4, 3.8, 9.2, 9.3 and 9.5.

Reason for Scope Determination

The Yard Facilities 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 Yard Facilities 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 Yard Facilities 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 Facilities 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 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)

3. Prevent liquid radioactive waste from being released to the environment in the event of a Safe Shutdown Earthquake (SSE). 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

1.2.3
2.5.5.5
8.2.1.1
9.5.1.2.2.3

License Renewal Boundary Drawings

LR-C-2

Table 2.4-17 Yard Facilities
Component Subject to Aging Management Review

Component Type	Intended Function
Bolting (Structural)	Structural Support
Cable Trays and Gutters	Shelter, Protection
	Structural Support
Concrete Anchors	Structural Support
Concrete Curbs	Direct Flow
Concrete Embedments	Structural Support
Concrete: Above-grade exterior (accessible)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Structural Support
Concrete: Above-grade exterior (inaccessible)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Structural Support
Concrete: Below-grade exterior (inaccessible)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Structural Support
Concrete: Below-grade interior (accessible) walls, floor, ceiling	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Structural Support
Concrete: Foundation (accessible)	Flood Barrier
	Shelter, Protection
	Structural Support
Concrete: Foundation (inaccessible)	Flood Barrier
	Shelter, Protection
	Structural Support
Conduit	Shelter, Protection
	Structural Support
Doors	Shelter, Protection
Duct Banks	Shelter, Protection
	Structural Support
Equipment supports and foundations	Structural Support
Hatches/Plugs (includes manhole covers)	Flood Barrier
	Shelter, Protection
Masonry walls: Above-grade exterior	Shelter, Protection
	Structural Support

Component Type	Intended Function
Metal components: All structural members (including RR Bridge Steel)	Structural Support
Metal siding (includes metal roof panels)	Shelter, Protection
	Structural Support
Miscellaneous steel (catwalks, stairs, handrails, ladders, vents and louvers, platforms, etc.)	Structural Support
Panels, Racks, Cabinets, and Other Enclosures	Shelter, Protection
	Structural Support
Penetration seals	Flood Barrier
	Shelter, Protection
Penetration sleeves	Shelter, Protection
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Flood Barrier
	Shelter, Protection
Seismic Gap Filler	Expansion/Separation
Steel Components (Bus Duct)	Shelter, Protection
	Structural Support
Steel Components: (Floor Drains)	Direct Flow
Tank Dikes	Water retaining boundary

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

Table 3.5.2-17 Yard Facilities
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 2.4.5.

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 Component Record List (CRL), as well as by interfacing with the parallel mechanical and civil screening efforts. The electrical components and commodities identified at LGS 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
- Connection Contacts
- Converters
- Electric Heaters
- Electrical Controls and Panel Internal Assemblies
- Electrical Penetrations
- Elements, RTDs, Sensors, Themocouples, 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 LGS 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 LGS. The seismic qualification of cable trays does not credit the use of cable ties. Cable tie wraps are not credited in the LGS design basis in terms of any 10 CFR 54.4 intended function. Cable tie wraps do not perform an intended function and therefore, are not subject to aging management review.

<u>Uninsulated Ground Conductors</u>

The Uninsulated Ground Conductors 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 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 LGS 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.3.1.2) 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 2.5.2.5.5. The shelter, protection and pressure boundary intended functions of electrical penetrations are included in the evaluation for Primary Containment, Section 2.4.11.

2.5.2.5.3 Fuse Holders

The Fuse Holder commodity includes fuse holders that are not part of a larger active assembly and are not included in the EQ Program. Both metallic and non-metallic portions of fuse holders that are not part of a larger active assembly and are not included in the EQ Program meet the screening criterion of 10 CFR 54.21(a)(1)(ii) and are subject to aging management review. Insulating portions of fuse holders are evaluated with Insulation Material for Electrical Cables and Connections (Section 2.5.2.5.5).

2.5.2.5.4 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.

2.5.2.5.5 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.

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.

2.5.2.5.6 Metal Enclosed Bus

The Metal Enclosed Bus distribute 4 kV power from the Safeguard Transformers to the 4 kV Class 1E switchgear utilizing non-segregated bus work. These portions of the power distribution system are in the scope of license renewal and supply electrical power from the switchyard to plant buses to power in scope license renewal components during recovery from a station blackout event. The metal enclosed bus is 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.

2.5.2.5.7 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 utility grid to plant buses to power 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 <u>Electrical Commodities Subject to Aging Management Review</u>

Commodity	Intended Function
Cable Connections (Metallic Parts)	Electrical Continuity
Fuse Holders	Electrical Continuity
High Voltage Insulators	Insulate (Electrical)
Insulation Material for Electrical Cables and Connections	Electrical Continuity
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 internal and external service environments that were used in the aging management review to determine aging effects requiring management are included in Table 3.0-1, Limerick Internal Service Environments and Table 3.0-2, Limerick External Service Environments. The environments used in the aging management reviews are listed in the Environment column. The third column identifies one or more of the NUREG-1801 environments that were used when comparing the Limerick 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-1801, 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-1801, 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 Pressure 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 Containment Atmosphere Control 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 the report indicate that many of the existing programs are adequate to manage the aging effects for particular structures or components, within the scope of license renewal, without change. The report also contains recommendations on specific areas for which existing programs should be augmented for license renewal. In order to take full advantage of NUREG-1801, a comparison between the AMR results and the tables of NUREG-1801 has been made. The results of that comparison are provided in the two tables.

Table 1

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 Limerick, the Engineered Safety Features System Group contains tables specific to the Containment Atmosphere Control System, Core Spray System, High Pressure Coolant Injection (HPCI) System, Reactor Core Isolation Cooling (RCIC) System, Residual Heat Removal (RHR) System and Standby Gas Treatment 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 environment to which the component types are exposed. Internal and external service environments are indicated and a list of these environments is provided in Tables 3.0-1 and 3.0-2, respectively.

Aging Effect Requiring Management – As part of the aging management review process, the aging effects required to maintain the intended function of the component type are identified for the material and environment combination. These aging effects requiring management are listed in the fifth column.

Aging Management 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 both standard lettered notes and plant-specific numbered notes.

The standard lettered notes, e.g., A, B, C, etc., provide standard information regarding comparison of the Limerick 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 information necessary to determine, in summary, how the Limerick 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. This includes explicit ASME Section III Class 1 analyses for piping and components and implicit ASME Section III, Class 2 and 3 and B31.1 analyses for piping. 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 (explicit or implicit) has been identified. See LRA Section 4.3 for details regarding the LGS fatigue design bases, fatigue TLAAs identified, and TLAA evaluations for the period of extended operation.

Table 3.0-1 – Limerick Internal Service Environments

Limerick AMR Environment	**Description**	**NUREG-1801 Environments Used For AMR Comparison**
Air/Gas-Dry	This 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. 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 Air/Gas - Wetted environment is used.	Gas Dried Air
Air/Gas-Wetted	Air/Gas environments containing significant amounts of moisture where condensation or water pooling may occur. This environment includes air with enough moisture to facilitate loss of material in steel caused by general, pitting, and crevice corrosion. Any <u>internal</u> air environment that does not meet the definition of Air/Gas – Dry (Internal) is to be categorized as Air/Gas – Wetted (Internal). This includes outdoor air drawn inside ventilation systems.	Condensation Condensation (Internal) Moist air or condensation (internal)

Limerick 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 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
Diesel Exhaust	This environment represents the exhaust from diesel engines. It is considered to have the potential to concentrate contaminants and be subject to wetting through condensation.	Diesel Exhaust
Fuel Oil	This environment includes fuel oil for the Emergency Diesel Generators and Diesel-driven Fire Pump. Water contamination of fuel oil is assumed.	Fuel oil
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 Schuylkill River and Perkiomen Creek, as well as, ground water from wells provide the sources of raw water utilized by LGS. Raw water is also rain or ground water. Raw water is water that has not been demineralized or treated to any significant extent.	Any Raw water Various

Limerick AMR Environment	Description	NUREG-1801 Environments Used For AMR Comparison
Reactor Coolant	Reactor coolant 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. This environment is used for the following systems for consistency with NUREG-1801 terminology: Reactor Vessel System, Reactor Vessel Internals System, and Reactor Coolant System. The temperature of the Reactor Coolant environment will always be assumed to be >482°F. The components in other systems that form a portion of the reactor coolant pressure boundary may use the Treated Water environment, which is functionally equivalent to the Reactor Coolant environment.	Reactor coolant Reactor coolant >250°C (>482°F) Reactor coolant/steam
Reactor Coolant and Neutron Flux	The Reactor Coolant and Neutron Flux environment should be selected for components within the Reactor Vessel System and Reactor Vessel Internals System 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 environment will always be assumed to be >482°F.	Reactor coolant and neutron flux Reactor coolant >250°C (>482°F) and neutron flux Reactor Coolant and High Fluence (> 1 x 10^{21} n/cm^2 E>0.1 Mev)
Sodium Pentaborate Solution	Treated water that contains sodium pentaborate. This is confined to the SLC system at Limerick which is contained within a limited area of the secondary containment.	Sodium Pentaborate solution
Steam	This is the internal environment associated with dry steam, such as Main Steam. This environment does not result in Flow-Accelerated Corrosion or Erosion. 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 is included within the Treated Water environment, and is not to be called Steam. Wet steam environments for LGS are described as either Treated Water or Reactor Coolant, depending upon location.	Steam

Limerick AMR Environment	Description	NUREG-1801 Environments Used For AMR Comparison
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 also includes all wet steam environments.	Treated water Steam
Treated Water >140°F	The same as the Treated Water environment, except the Treated Water >140°F environment is to be selected for systems operating at temperatures >140°F that contain stainless steel components.	Treated water >140°F Treated water Steam
Treated Water >482°F	The same as the Treated Water environment, except the Treated Water >482°F environment is to be selected for systems operating at temperatures >482°F and that contain Cast Austenitic Stainless Steel (CASS) components.	Treated water >482°F Treated water >140°F Treated water Reactor Coolant >482°F Steam
Waste Water	Radioactive, potentially radioactive, or non-radioactive waters that are collected from equipment and floor drains. Waste waters may contain contaminants, including oil, depending on location, as well as originally treated water that is not monitored by a chemistry program.	Waste water
Waste Water >140°F	The same as the Waste Water environment, except the Waste Water >140°F environment is to be selected for systems operating at temperatures >140°F that contain stainless steel components.	Waste water

Table 3.0-2 – Limerick External Service Environments

Limerick AMR Environment	Description	NUREG-1801 Environments Used For AMR Comparison
Adverse Localized Environment	This 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. This environment is used for electrical commodities.	Adverse Localized Environment
Air – Indoor, Controlled	This environment is one to which the specified internal or external surface of the component or structure is exposed; 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. In general, at Limerick this environment should only be applied within the Control Room Envelope or inside certain HVAC ducts, plenums or other components.	Air – Indoor controlled
Air – Indoor, Uncontrolled	The Air - Indoor Uncontrolled (External) environment is for indoor locations that are sheltered or protected from weather. Humidity levels up to 100 percent are assumed and the surfaces of components in this environment may be wet. In addition, the NUREG-1801 environments defined for Air with Steam or Water Leakage are included within this environment description. This environment may contain aggressive chemical species including oxygen, halides, sulfates, or other aggressive corrosive substances that can influence the nature, rate, and severity of corrosion effects. It is assumed that these contaminants can concentrate to levels that will promote corrosive effects because of factors such as cyclic (wet-dry) condensation, contaminated insulation, accidental contamination, or leakage areas.	Air – indoor uncontrolled Air – indoor uncontrolled (>95°F) (Internal/External) Air with steam or water leakage Air with leaking secondary-side water and/or steam Condensation (Internal or External)
Air with reactor coolant leakage	This 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 System temperature up to 288^{0}C (550^{0}F)

Limerick AMR Environment	Description	NUREG-1801 Environments Used For AMR Comparison
Air – Outdoor	Air – Outdoor (External) is atmospheric air with a temperature range of -9°F to 107°F and a relative humidity range of 10% to 100%. This environment is subject to periodic wetting and wind.	Air - indoor and outdoor Air - indoor uncontrolled or air – outdoor Air - indoor uncontrolled or air outdoor Air – outdoor Air - outdoor (External) Any Underground Various
Concrete	This 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 Buried
Encased in Steel	Concrete encased in steel is protected from environments that promote age related degradations. The concrete which is totally enclosed and contained within the inner, outer, sleeve, and cover steel plates of 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. In the case of a steel lined concrete primary containment, the concrete covered by the steel liner is exempt from examination requirements, whereas other concrete surfaces which are exposed to other environments require examination. However, the encased in steel environment is not applied to a steel lined concrete primary containment since the concrete is not completely encased in steel and concrete surfaces exist which are exposed to other environments.	Environment not addressed in NUREG-1801
Groundwater/Soil	This is the external environment for components buried in the soil where there is groundwater in the soil.	Groundwater/Soil Buried
Soil	This is the external environment for components buried in the soil, and it includes ground water in the soil.	Soil Buried

Limerick AMR Environment	Description	NUREG-1801 Environments Used For AMR Comparison
Water – flowing	Water that is refreshed, thus having larger impact on leaching; this can be raw water, groundwater, or flowing water under a foundation.	Water – flowing Water – flowing under foundation
Water – standing	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 – standing

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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 (2.3.1.1)
- Reactor Pressure 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 Reactor Vessel, Internals, and Reactor Coolant System.

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

Table 3.1.2-2 Reactor Pressure 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

Materials

The materials of construction for the Reactor Coolant Pressure Boundary components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Cast Austenitic Stainless Steel (CASS)
- Nickel Alloy
- Stainless Steel
- Stainless Steel Bolting

Environments

The Reactor Coolant Pressure Boundary 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 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 Coolant Pressure Boundary 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.2.1.25)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)
- Lubricating Oil Analysis (B.2.1.27)
- One-Time Inspection (B.2.1.22)
- One-time Inspection of ASME Code Class 1 Small-Bore Piping (B.2.1.24)

- TLAA
- Water Chemistry (B.2.1.2)

3.1.2.1.2 Reactor Pressure Vessel

Materials

The materials of construction for the Reactor Pressure Vessel components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- 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 Pressure Vessel components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air with Reactor Coolant Leakage
- Reactor Coolant
- Reactor Coolant and Neutron Flux

Aging Effects Requiring Management

The following aging effects associated with the Reactor Pressure 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 Pressure 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.2.1.25)
- One-Time Inspection (B.2.1.22)
- Reactor Head Closure Stud Bolting (B.2.1.3)
- Reactor Vessel Surveillance (B.2.1.21)
- 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
- 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 Pressure Vessel, Reactor Vessel Internals and Reactor Coolant Pressure Boundary, these programs are addressed in the following subsections.

3.1.2.2.1 Cumulative Fatigue Damage

The evaluation of metal fatigue as a TLAA for the Reactor Pressure Vessel, Reactor Vessel Internals, Reactor Coolant Pressure Boundary, and Control Rod Drive System is discussed in Sections 4.3.1, 4.3.3, 4.3.4, 4.6.5, and 4.6.6.

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).*

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 LGS.

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 and internals system 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.

LGS will implement the Reactor Vessel Surveillance (B.2.1.21) program to manage the loss of fracture toughness of the reactor vessel beltline components and welds exposed to a reactor coolant and 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. The Reactor Vessel Surveillance program is described in Appendix B.

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 LGS.

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 stainless steel ASME Code Class 1 piping that also has potential cracking aging mechanisms including thermal, mechanical and vibratory loading. This line is welded to a short section of carbon steel piping which is welded to a nozzle on the flange. Therefore, Item Number 3.1.1-39 is used to manage cracking of this line through the use of the One-Time Inspection of ASME Code Class 1 Small-Bore Piping (B.2.1.24) program, Water Chemistry (B.2.1.2) program, and ASME Section XI Inservice Inspection, Subsection IWB, IWC, and IWD (B.2.1.1) program. Cracking of the carbon steel section of this piping is also managed by the One-Time Inspection of ASME Code Class 1 Small-Bore Piping program, Water Chemistry program, and ASME Section XI Inservice Inspection, Subsection IWB, IWC, and IWD program. The nozzle and attached piping are exposed to a reactor coolant environment. The nickel alloy reactor vessel head flange seal leak detection nozzle is evaluated with the Reactor Pressure Vessel. The LGS ISI program requires VT-2 visual examination during system leakage testing per Table IWB-2500-1, Examination Category B-P in accordance with IWB-5220. LGS currently utilizes an approved relief request that allows performing a VT-2 visual examination of the line for leakage at a reduced pressure prior to reactor cavity drain down during each refueling outage. The Water Chemistry program activities provide for monitoring and controlling of water chemistry in accordance with EPRI BWR Vessel and Internals Project BWR Water Chemistry Guidelines. The Water Chemistry program activities prevent or mitigate the cracking aging effect. The periodic ISI examinations, together with the one-time inspection program for the piping, and the Water Chemistry program will adequately identify, evaluate, and manage the effects of cracking in the nickel alloy nozzle and stainless steel vessel flange leak detection line to ensure there is no loss of intended function during the period of extended operation. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1), One-Time Inspection of ASME Code Class 1 Small-Bore Piping (B.2.1.24) and Water Chemistry (B.2.1.2) programs are described in Appendix B.

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 LGS 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 LGS.

[1] Refer to the GALL Report, Chapter I, for applicability of other editions of the ASME Code, Section XI.

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 LGS.

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 LGS.

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 LGS 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 LGS.

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).

Item Number 3.1.1-23 is applicable to PWRs only and is not used for LGS.

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).

Item Number 3.1.1-24 is applicable to PWRs only and is not used for LGS.

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 LGS.

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 3.1.1-25 is applicable to PWRs only and is not used for LGS.

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.

Item Number 3.1.1-26 is applicable to PWRs only and is not used for LGS.

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).

Item Number 3.1.1-27 is applicable to PWRs only and is not used for LGS.

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).

Item Number 3.1.1-28 is applicable to PWRs only and is not used for LGS.

3.1.2.2.15 Quality Assurance for Aging Management of Nonsafety-Related Components

Quality Assurance provisions applicable to license renewal are discussed in Section B.1.3.

3.1.2.3 Time-Limited Aging Analysis

The time-limited aging analyses identified below are associated with the Reactor Vessel, Internals, and Reactor Coolant System components:

- Section 4.2, Reactor Vessel Neutron Embrittlement Analysis
- Section 4.3, Metal Fatigue
    - 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 Calculations
  - Section 4.3.3, Environmental Fatigue Analysis for RPV and Class 1 Piping
  - Section 4.3.4, Reactor Vessel Internals Fatigue Analyses
- Section 4.6, Other Plant-Specific Time-Limited Aging Analyses
  - Section 4.6.3, RPV Core Plate Rim Hold-Down Bolt Loss of Preload
  - Section 4.6.4, Main Steam Line Flow Restrictors Erosion Analysis
  - Section 4.6.5, Jet Pump Auxiliary Spring Wedge Assembly
  - Section 4.6.6, Jet Pump Restrainer Bracket Pad Repair Clamps
  - Section 4.6.9, Jet Pump Slip Joint Repair Clamps

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.

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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 fatgue	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	PWRs 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.
3.1.1-5	PWRs 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
3.1.1-6	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	PWRs only				
3.1.1-9	PWRs only				
3.1.1-10	PWRs 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
3.1.1-11	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	PWRs 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	Fatigue is a TLAA; further evaluation is documented in Subsection 3.1.2.2.3.1.
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.2.1.21) program will be used to manage loss of fracture toughness of the carbon or low alloy steel with stainless steel cladding reactor vessel beltline shell components. See Subsection 3.1.2.2.3.2.
3.1.1-15	PWRs only				

Table 3.1.1 Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-16	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. The top head enclosure vessel flange leak detection line is stainless steel ASME Code Class 1 piping that also has potential cracking aging mechanisms including thermal, mechanical and vibratory loading. Therefore, Item Number 3.1.1-39 is used to manage cracking of this line. See subsection 3.1.2.2.4.1
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 (See subsection 3.1.2.2.4.2)	Not applicable. See subsection 3.1.2.2.4.2
3.1.1-18	PWRs only				
3.1.1-19	PWRs only				
3.1.1-20	PWRs 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 (See subsection 3.1.2.2.7)	Not applicable. 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	PWRs only				
3.1.1-23	PWRs only				
3.1.1-24	PWRs only				
3.1.1-25	PWRs only				
3.1.1-26	PWRs only				
3.1.1-27	PWRs only				
3.1.1-28	PWRs only				
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 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
3.1.1-30	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. 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 carbon or low alloy steel with stainless steel cladding, stainless steel, or nickel alloy reactor vessel penetrations and shell components exposed to reactor coolant and reactor coolant and neutron flux in the Reactor Pressure Vessel.
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.2.1.22) 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 steel and stainless steel RPV flange leak detection line and Class 1 piping, fittings and branch connections < 4-inch nominal pipe size exposed to reactor coolant in the Reactor Coolant Pressure Boundary. The LGS BWR design does not include an isolation condenser.
3.1.1-32	PWRs only				
3.1.1-33	PWRs only				
3.1.1-34	PWRs 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
3.1.1-35	PWRs only				
3.1.1-36	PWRs only				
3.1.1-37	PWRs 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 cast austenitic stainless steel pump casings, and valve bodies and bonnets exposed to reactor coolant and treated water >250 deg-C (>482 deg-F) in the Reactor Coolant Pressure Boundary. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) program has been substituted and will be used to manage loss of fracture toughness of cast austenitic stainless steel pump casings in the Reactor Water Cleanup 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. 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.2.1.24) program will be used to manage cracking of the steel and stainless steel RPV flange leak detection line and Class 1 piping, fittings and branch connections < 4-inch nominal pipe size exposed to reactor coolant in the Reactor Coolant Pressure Boundary.
3.1.1-40	PWRs only				
3.1.1-40x	PWRs 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. There are no nickel alloy core shroud and core plate access hole cover (mechanical covers) exposed to reactor coolant in the Reactor Vessel, Internals and Reactor Coolant System. The core shroud and core plate access hole covers are a welded design and are addressed in Item Number 3.1.1-29.
3.1.1-42	PWRs 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
3.1.1-43	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 exposed to reactor coolant and reactor coolant and neutron flux in the Reactor Vessel Internals.
3.1.1-44	PWRs only				
3.1.1-45	PWRs only				
3.1.1-46	PWRs only				
3.1.1-47	PWRs only				
3.1.1-48	PWRs only				
3.1.1-49	PWRs 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
3.1.1-50	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 LGS BWR design does not include cast austenitic stainless steel Class 1 piping, piping component, and piping elements or control rod drive pressure housings exposed to reactor coolant >250 deg-C (>482 deg-F). The CRD housings and flanges are stainless steel.
3.1.1-51	PWRs only				
3.1.1-52	PWRs only				
3.1.1-53	PWRs only				
3.1.1-54	PWRs only				
3.1.1-55	PWRs only				
3.1.1-56	PWRs only				
3.1.1-58	PWRs only				
3.1.1-59	PWRs 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	Not applicable. There are no steel piping, piping components or piping elements exposed to reactor coolant that are susceptible to wall thinning due to flow-accelerated corrosion in the Reactor Vessel, Internals and Reactor Coolant System.
3.1.1-61	PWRs only				
3.1.1-62	PWRs 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 steel closure bolting exposed to air with reactor coolant leakage in the Reactor Pressure Vessel and Reactor Coolant Pressure Boundary.
3.1.1-64	PWRs only				
3.1.1-65	PWRs only				
3.1.1-66	PWRs 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 steel closure bolting exposed to air with reactor coolant leakage in the Reactor Pressure Vessel and Reactor Coolant Pressure Boundary.

Table 3.1.1 Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-68	PWRs only				
3.1.1-69	PWRs only				
3.1.1-70	PWRs only				
3.1.1-71	PWRs only				
3.1.1-72	PWRs only				
3.1.1-73	PWRs only				
3.1.1-74	PWRs only				
3.1.1-75	PWRs only				
3.1.1-76	PWRs only				
3.1.1-77	PWRs only				
3.1.1-78	PWRs 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. The Water Chemistry (B.2.1.2) program and One-Time Inspection (B.2.1.22) program will be used to manage loss of material of stainless steel and nickel-alloy reactor coolant pressure boundary components exposed to reactor coolant in the Reactor Coolant Pressure Boundary.

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	PWRs only				
3.1.1-81	PWRs only				
3.1.1-82	PWRs only				
3.1.1-83	PWRs 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. The Water Chemistry (B.2.1.2) program and One-Time Inspection (B.2.1.22) program will be used to manage loss of material of steel top head and other reactor vessel nozzles, safe-ends and reactor vessel attachments exposed to reactor coolant in the Reactor Pressure Vessel.
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. The Water Chemistry (B.2.1.2) program and One-Time Inspection (B.2.1.22) program will be used to manage loss of material of stainless steel, nickel-alloy, and carbon or low alloy steel with stainless steel 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 Pressure Vessel.
3.1.1-86	PWRS only				
3.1.1-87	PWRS 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
3.1.1-88	PWRS only				
3.1.1-89	PWRS only				
3.1.1-90	PWRS 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. The Reactor Head Closure Stud Bolting (B.2.1.3) program will be used to manage cracking and loss of material of the high-strength low alloy steel closure head stud assembly exposed to air with reactor coolant leakage in the Reactor Pressure Vessel.
3.1.1-92	PWRs only				
3.1.1-93	PWRs only				
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. 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 stainless steel and nickel alloy vessel shell attachment welds exposed to reactor coolant and reactor coolant and neutron flux in the Reactor Pressure 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
3.1.1-95	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 steel feedwater nozzles exposed to reactor coolant in the Reactor Pressure 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 Pressure 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. 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, piping elements greater than or equal to 4-inch nominal pipe size, nozzle safe ends and associated welds in the Reactor Coolant Pressure Boundary and Reactor Pressure Vessel. The One-Time Inspection (B.2.1.22) 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 nickel alloy tubing within the HPCI steam flow element in the Reactor Coolant Pressure Boundary. 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 reactor recirculation pumps in the Reactor Coolant Pressure Boundary.

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. 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 and CRD housing reactor vessel penetrations, and instrumentation nozzles exposed to reactor coolant and reactor coolant and neutron flux in the Reactor Pressure Vessel.
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. The LGS BWR design does not include PH martensitic stainless steel or martensitic stainless steel reactor vessel internal components.
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 reactor vessel internals components including jet pump wedges and steam dryer support seismic blocks exposed to reactor coolant and 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. 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 assembly components, core shroud access covers and steam dryers exposed to reactor coolant and reactor coolant and neutron flux in the Reactor Vessel Internals.
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. 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 pressure vessel nozzles and reactor internal components exposed to reactor coolant and reactor coolant and neutron flux in the Reactor Pressure Vessel and 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
3.1.1-104	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. 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 vessel internal components exposed to reactor coolant and neutron flux in the Reactor Vessel Internals.
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 or 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.

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
3.1.1-107	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.

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

Table 3.1.2-1 Reactor Coolant Pressure Boundary

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)	Cumulative Fatigue Damage	TLAA	IV.C1.RP-44	3.1.1-11	A, 1
				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, 1
				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
		Stainless Steel Bolting	Air - Indoor, Uncontrolled (External)	Cumulative Fatigue Damage	TLAA	IV.C1.RP-44	3.1.1-11	A, 1
				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
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.2.1.25)	V.E.E-44	3.2.1-40	A
			Reactor Coolant	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.2.1.24)	IV.C1.RP-230	3.1.1-39	A
					Water Chemistry (B.2.1.2)	IV.C1.RP-230	3.1.1-39	A

Table 3.1.2-1 Reactor Coolant Pressure Boundary (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	Carbon Steel	Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.C1.R-220	3.1.1-6	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.C1.RP-39	3.1.1-31	E, 2
					Water Chemistry (B.2.1.2)	IV.C1.RP-39	3.1.1-31	C
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Reactor Coolant	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.2.1.24)	IV.C1.RP-230	3.1.1-39	A
					Water Chemistry (B.2.1.2)	IV.C1.RP-230	3.1.1-39	A
				Cumulative Fatigue Damage	TLAA	IV.C1.R-220	3.1.1-6	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.C1.RP-158	3.1.1-79	A
					Water Chemistry (B.2.1.2)	IV.C1.RP-158	3.1.1-79	A
Flow Device (Instrumentation Flow Orifices)	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.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
Flow Device (Main Steam Flow Elements)	Throttle	Carbon Steel	Steam (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.B2.SP-160	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-160	3.4.1-14	A

Table 3.1.2-1 Reactor Coolant Pressure Boundary (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Flow Device (Main Steam Flow Elements)	Throttle	Cast Austenitic Stainless Steel (CASS)	Steam (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VIII.B2.SP-98	3.4.1-11	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-98	3.4.1-11	A
				Loss of Material	TLAA			H, 3
					One-Time Inspection (B.2.1.22)	VIII.B2.SP-155	3.4.1-16	A, 4
					Water Chemistry (B.2.1.2)	VIII.B2.SP-155	3.4.1-16	A
Heat Exchanger Components (Recirculation Pump Seal Cooler Tubes)	Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (External)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.A-52	3.3.1-49	C
			Treated Water > 140°F (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VII.E3.AP-112	3.3.1-20	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-112	3.3.1-20	A
				Loss of Material	One-Time Inspection (B.2.1.22)	VII.A4.AP-111	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-111	3.3.1-25	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.2.1.25)	V.E.E-44	3.2.1-40	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VII.G.AP-117	3.3.1-97	C
					One-Time Inspection (B.2.1.22)	VII.G.AP-117	3.3.1-97	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-281	3.3.1-91	A

Table 3.1.2-1 Reactor Coolant Pressure Boundary (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.2.1.25)	V.E.E-44	3.2.1-40	A
			Steam (Internal)	Cumulative Fatigue Damage	TLAA	VIII.B2.S-08	3.4.1-1	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	VIII.B2.SP-160	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-160	3.4.1-14	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.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
		Nickel Alloy	Reactor Coolant	Cracking	One-Time Inspection (B.2.1.22)	IV.C1.R-21	3.1.1-97	E, 2
					Water Chemistry (B.2.1.2)	IV.C1.R-21	3.1.1-97	C
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.C1.RP-158	3.1.1-79	A
					Water Chemistry (B.2.1.2)	IV.C1.RP-158	3.1.1-79	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Reactor Coolant	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	A
				Cumulative Fatigue Damage	TLAA	IV.C1.R-220	3.1.1-6	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.C1.RP-158	3.1.1-79	A
					Water Chemistry (B.2.1.2)	IV.C1.RP-158	3.1.1-79	A
			Steam (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VIII.B2.SP-98	3.4.1-11	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-98	3.4.1-11	A

Table 3.1.2-1 Reactor Coolant Pressure Boundary (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	Steam (Internal)	Cumulative Fatigue Damage	TLAA	IV.C1.R-220	3.1.1-6	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	VIII.B2.SP-155	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-155	3.4.1-16	A
			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	A
				Cumulative Fatigue Damage	TLAA	IV.C1.R-220	3.1.1-6	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
Pump Casing (Recirculation Pump)	Pressure Boundary	Cast Austenitic Stainless Steel (CASS)	Air - Indoor, Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Reactor Coolant	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.C1.R-20	3.1.1-97	E, 5
					Water Chemistry (B.2.1.2)	IV.C1.R-20	3.1.1-97	A
				Cumulative Fatigue Damage	TLAA	IV.C1.R-220	3.1.1-6	A, 1
				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.2.1.22)	IV.C1.RP-158	3.1.1-79	A
					Water Chemistry (B.2.1.2)	IV.C1.RP-158	3.1.1-79	A

Table 3.1.2-1 Reactor Coolant Pressure Boundary (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
RPV Flange Leak Detection Line	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.E.E-44	3.2.1-40	A
			Reactor Coolant	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.2.1.24)	IV.C1.RP-230	3.1.1-39	A
					Water Chemistry (B.2.1.2)	IV.C1.RP-230	3.1.1-39	A
				Cumulative Fatigue Damage	TLAA	IV.C1.R-220	3.1.1-6	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.C1.RP-39	3.1.1-31	E, 2
					Water Chemistry (B.2.1.2)	IV.C1.RP-39	3.1.1-31	C
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Reactor Coolant	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.2.1.24)	IV.C1.RP-230	3.1.1-39	A
					Water Chemistry (B.2.1.2)	IV.C1.RP-230	3.1.1-39	A
				Cumulative Fatigue Damage	TLAA	IV.C1.R-220	3.1.1-6	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.C1.RP-39	3.1.1-31	E, 2
					Water Chemistry (B.2.1.2)	IV.C1.RP-39	3.1.1-31	C

Table 3.1.2-1 Reactor Coolant Pressure Boundary (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Recirc Motor Driver Mount	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.E.E-44	3.2.1-40	A
Valve Body	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.E.E-44	3.2.1-40	A
			Steam (Internal)	Cumulative Fatigue Damage	TLAA	IV.C1.R-220	3.1.1-6	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	VIII.B2.SP-160	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-160	3.4.1-14	A
			Treated Water (Internal)	Cumulative Fatigue Damage	TLAA	IV.C1.R-220	3.1.1-6	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
		Cast Austenitic Stainless Steel (CASS)	Air - Indoor, Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Reactor Coolant	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	IV.C1.R-20	3.1.1-97	E, 5
					Water Chemistry (B.2.1.2)	IV.C1.R-20	3.1.1-97	A
				Cumulative Fatigue Damage	TLAA	IV.C1.R-220	3.1.1-6	A, 1
				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.2.1.22)	IV.C1.RP-158	3.1.1-79	A
					Water Chemistry (B.2.1.2)	IV.C1.RP-158	3.1.1-79	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 (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 > 140°F (Internal)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1)	V.D2.E-37	3.2.1-54	E, 5
					Water Chemistry (B.2.1.2)	V.D2.E-37	3.2.1-54	A
				Cumulative Fatigue Damage	TLAA	IV.C1.R-220	3.1.1-6	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A

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 One-Time Inspection (B.2.1.22) 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 erosion of the main steam line flow restrictor venturi is evaluated in Section 4.6.

4. The upstream venturi section of each main steam line (MSL) flow restrictor is fabricated from centrifugal-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 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.

Table 3.1.2-2
Reactor Pressure Vessel
Summary of Aging Management Evaluation

Table 3.1.2-2 Reactor Pressure 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	A
				Cumulative Fatigue Damage	TLAA	IV.A1.RP-201	3.1.1-1	A, 1
				Loss of Material	Reactor Head Closure Stud Bolting (B.2.1.3)	IV.A1.RP-165	3.1.1-91	A
Bolting (Head Spray, CRD Housing, Head Vent, Spare Nozzle)	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air with Reactor Coolant Leakage (External)	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
CRD Housing Penetration	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	A
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A

Table 3.1.2-2 Reactor Pressure Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
CRD Housing Penetration	Pressure Boundary	Stainless Steel	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	A
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
Incore Monitor Penetration	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	A
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
		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	A
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
Nozzle (N1 Recirculation Outlet)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor, Uncontrolled (External)	None	None			H, 2

Table 3.1.2-2 Reactor Pressure Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Nozzle (N1 Recirculation Outlet)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant	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	C
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
Nozzle (N10 Core Differential Pressure)	Pressure Boundary	Nickel Alloy	Air - Indoor, Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A
			Reactor Coolant	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	C
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Reactor Coolant	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	C
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A

Table 3.1.2-2 Reactor Pressure Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Nozzle (N11 Instrumentation)	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	A
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
Nozzle (N12 Instrumentation)	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	A
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
Nozzle (N13 Seal Leak Detection)	Pressure Boundary	Nickel Alloy	Air - Indoor, Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A
			Reactor Coolant	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	C
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
Nozzle (N15 Drain)	Pressure Boundary	Low Alloy Steel	Air - Indoor, Uncontrolled (External)	None	None			H, 2

Table 3.1.2-2 Reactor Pressure Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Nozzle (N15 Drain)	Pressure Boundary	Low Alloy Steel	Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-50	3.1.1-84	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-50	3.1.1-84	C
Nozzle (N16 Instrumentation)	Pressure Boundary	Nickel Alloy	Air - Indoor, Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A
			Reactor Coolant and Neutron Flux	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	A
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 1
				Loss of Fracture Toughness	TLAA			H, 4
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
Nozzle (N17 LPCI)	Direct Flow (Thermal Sleeve)	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	C
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
		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	C
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A

Table 3.1.2-2 Reactor Pressure Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Nozzle (N17 LPCI)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor, Uncontrolled (External)	None	None			H, 2
			Reactor Coolant and Neutron Flux	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	C
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 1
				Loss of Fracture Toughness	TLAA	IV.A1.R-67	3.1.1-13	A, 3
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
Nozzle (N2 Recirculation Inlet)	Direct Flow (Thermal Sleeve)	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	C
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
		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	C
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor, Uncontrolled (External)	None	None			H, 2

Table 3.1.2-2 Reactor Pressure Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Nozzle (N2 Recirculation Inlet)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant	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	C
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
Nozzle (N3 Steam Outlet)	Pressure Boundary	Low Alloy Steel	Air - Indoor, Uncontrolled (External)	None	None			H, 2
			Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-50	3.1.1-84	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-50	3.1.1-84	C
Nozzle (N4 Feedwater)	Direct Flow (Thermal Sleeve)	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	C
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
		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	C
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
	Pressure Boundary	Low Alloy Steel	Air - Indoor, Uncontrolled (External)	None	None			H, 2

Table 3.1.2-2 Reactor Pressure Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Nozzle (N4 Feedwater)	Pressure Boundary	Low Alloy Steel	Reactor Coolant	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, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-50	3.1.1-84	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-50	3.1.1-84	C
Nozzle (N5 Core Spray)	Direct Flow (Thermal Sleeve)	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	C
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
		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	C
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor, Uncontrolled (External)	None	None			H, 2
			Reactor Coolant	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	C
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A

Table 3.1.2-2 Reactor Pressure Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Nozzle (N5 Core Spray)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant	Loss of Material	Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
Nozzle (N6, N7 Head Spray, Spare, Vent)	Pressure Boundary	Low Alloy Steel	Air - Indoor, Uncontrolled (External)	None	None			H, 2
			Reactor Coolant	Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-50	3.1.1-84	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-50	3.1.1-84	A
Nozzle (N8 Jet Pump Instrumentation)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor, Uncontrolled (External)	None	None			H, 2
			Reactor Coolant	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	C
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
Nozzle (N9 CRD Return Line - Capped)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor, Uncontrolled (External)	None	None			H, 2
			Reactor Coolant	Cracking	BWR Control Rod Drive Return Line Nozzle (B.2.1.6)	IV.A1.R-66	3.1.1-96	A

Table 3.1.2-2 Reactor Pressure Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Nozzle (N9 CRD Return Line - Capped)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant	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	C
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
		Low Alloy Steel	Air - Indoor, Uncontrolled (External)	None	None			H, 2
			Reactor Coolant	Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-50	3.1.1-84	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-50	3.1.1-84	C
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Reactor Coolant	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	A
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
Nozzle Safe Ends and Welds (N1 Recirculation Outlet)	Pressure Boundary	Nickel Alloy	Reactor Coolant	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	A
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A

Table 3.1.2-2 Reactor Pressure Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Nozzle Safe Ends and Welds (N1 Recirculation Outlet)	Pressure Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Reactor Coolant	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	A
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
Nozzle Safe Ends and Welds (N10 Core Differential Pressure)	Pressure Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Reactor Coolant	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	C
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
Nozzle Safe Ends and Welds (N17 LPCI)	Pressure Boundary	Nickel Alloy	Air - Indoor, Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A
			Reactor Coolant and Neutron Flux	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	A
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 1

Table 3.1.2-2 Reactor Pressure Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Nozzle Safe Ends and Welds (N17 LPCI)	Pressure Boundary	Nickel Alloy	Reactor Coolant and Neutron Flux	Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
Nozzle Safe Ends and Welds (N2 Recirculation Inlet)	Pressure Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A
			Reactor Coolant	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	A
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
Nozzle Safe Ends and Welds (N3 Steam Outlet)	Pressure Boundary	Low Alloy Steel	Air - Indoor, Uncontrolled (External)	None	None			H, 2
			Reactor Coolant	Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-50	3.1.1-84	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-50	3.1.1-84	C
Nozzle Safe Ends and Welds (N4 Feedwater)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor, Uncontrolled (External)	None	None			H, 2
			Reactor Coolant	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	A
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 1

Table 3.1.2-2 Reactor Pressure Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Nozzle Safe Ends and Welds (N4 Feedwater)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant	Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
		Low Alloy Steel	Air - Indoor, Uncontrolled (External)	None	None			H, 2
			Reactor Coolant	Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-50	3.1.1-84	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-50	3.1.1-84	C
Nozzle Safe Ends and Welds (N5 Core Spray)	Pressure Boundary	Nickel Alloy	Air - Indoor, Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A
			Reactor Coolant	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	A
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
Nozzle Safe Ends and Welds (N8 Jet Pump Instrumentation)	Pressure Boundary	Nickel Alloy	Reactor Coolant	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	A
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	IV.E.RP-04	3.1.1-107	A

Table 3.1.2-2 Reactor Pressure Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Nozzle Safe Ends and Welds (N8 Jet Pump Instrumentation)	Pressure Boundary	Stainless Steel	Reactor Coolant	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	A
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
Nozzle Safe Ends and Welds (N9 CRD Return Line - Capped)	Pressure Boundary	Nickel Alloy	Air - Indoor, Uncontrolled (External)	None	None	IV.E.RP-03	3.1.1-106	A
			Reactor Coolant	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	A
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
Reactor Vessel (Bottom Head, Welds)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor, Uncontrolled (External)	None	None			H, 2
			Reactor Coolant	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	C
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A

Table 3.1.2-2 Reactor Pressure 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 and Welds)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor, Uncontrolled (External)	None	None			H, 2
			Reactor Coolant and Neutron Flux	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	C
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 1
				Loss of Fracture Toughness	Reactor Vessel Surveillance (B.2.1.21)	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.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
Reactor Vessel (Top Head, Flanges, Welds)	Pressure Boundary	Carbon or Low Alloy Steel with Stainless Steel Cladding	Air - Indoor, Uncontrolled (External)	None	None			H, 2
			Reactor Coolant	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	C
				Cumulative Fatigue Damage	TLAA	IV.A1.R-04	3.1.1-7	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A

Table 3.1.2-2 Reactor Pressure 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 (Stabilizer Bracket)	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled (External)	Cumulative Fatigue Damage	TLAA	IV.A1.R-70	3.1.1-4	A, 1, 2
Reactor Vessel External Attachments (Support Skirt, Refueling Bellows Bracket)	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled (External)	Cumulative Fatigue Damage	TLAA	IV.A1.R-70	3.1.1-4	A, 1
				Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.E.E-44	3.2.1-40	A
Reactor Vessel Internal Attachments	Structural Support to maintain core configuration and flow distribution	Low Alloy Steel	Reactor Coolant	Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-50	3.1.1-84	C
					Water Chemistry (B.2.1.2)	IV.A1.RP-50	3.1.1-84	C
		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	A
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
					BWR Vessel ID Attachment Welds (B.2.1.4)			H, 5
		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	A
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A

Table 3.1.2-2 Reactor Pressure 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	Loss of Material	Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A
			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	A
				Loss of Material	One-Time Inspection (B.2.1.22)	IV.A1.RP-157	3.1.1-85	A
					Water Chemistry (B.2.1.2)	IV.A1.RP-157	3.1.1-85	A

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 Reactor Pressure Vessel, stabilizer bracket, 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. Therefore, wetting due to condensation and moisture accumulation will not occur and loss of material due to general corrosion does not apply.

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.

4. TLAA is used to manage the aging effect(s) applicable to this component type, material and environment combination and is evaluated in Section 4.2.

5. The BWR Vessel ID Attachment Welds (B.2.1.4) program is used to manage the aging effect(s) applicable to this component type, material and environment combination. Loss of material due to wear is applicable to the steam dryer support brackets as identified by operating experience review.

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	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	A
Core Shroud (including repairs) and Core Plate: Shroud support structure (shroud support cylinder, shroud support plate, shroud support legs)	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	A
				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	A

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)	Structural Support to maintain core configuration and flow distribution	Nickel Alloy	Reactor Coolant	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	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	A
		Stainless Steel	Reactor Coolant	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	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	A
Core Shroud and Core Plate: Core plate, Core plate bolts (used in early BWRs)	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	A
				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	A
				Loss of Preload	TLAA			H, 3
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-97	3.1.1-103	A
					Water Chemistry (B.2.1.2)	IV.B1.R-97	3.1.1-103	A
				Loss of Fracture Toughness	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-219	3.1.1-99	C

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	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	A
		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	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	A
		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	A
				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	A
Core Spray Lines and Spargers: Core spray lines (headers), Spray rings, Spray nozzles, Thermal sleeves	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	A
				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	A

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, Thermal sleeves	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	A
					Water Chemistry (B.2.1.2)	IV.B1.R-99	3.1.1-103	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	A
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	A
				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	A
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	A

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
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	Reactor Coolant and Neutron Flux	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	A
Jet Pump Assemblies: Castings	Pressure Boundary	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	A
				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	A
Jet Pump Assemblies: Jet pump sensing line	Pressure Boundary	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	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	A

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: Thermal sleeve inlet header, Riser brace arm, Holddown beams, Inlet elbow, Mixing assembly, Diffuser Castings, Slip joint clamp, Wedge assemblies	Pressure Boundary	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	A
				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	A
		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	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	A
					BWR Vessel Internals (B.2.1.9)	IV.B1.RP-377	3.1.1-100	A
				Loss of Preload	TLAA			H, 4
					BWR Vessel Internals (B.2.1.9)			H, 5
		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	A
				Cumulative Fatigue Damage	TLAA	IV.B1.R-53	3.1.1-3	A, 8

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: Thermal sleeve inlet header, Riser brace arm, Holddown beams, Inlet elbow, Mixing assembly, Diffuser Castings, Slip joint clamp, Wedge assemblies	Pressure Boundary	X-750 alloy	Reactor Coolant and Neutron Flux	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	A
					BWR Vessel Internals (B.2.1.9)			F, 7
				Loss of Preload	TLAA			H, 4
Reactor Vessel Internals Components (Control Rod 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	A
				Loss of Fracture Toughness	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-220	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	A
		Stainless Steel	Reactor Coolant and Neutron Flux	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.R-105	3.1.1-103	C
					Water Chemistry (B.2.1.2)	IV.B1.R-105	3.1.1-103	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	A

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
Steam Dryers	Structural Support	Stainless Steel	Reactor Coolant	Cracking	BWR Vessel Internals (B.2.1.9)	IV.B1.RP-155	3.1.1-101	A
					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	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	A
					BWR Vessel Internals (B.2.1.9)	IV.B1.RP-377	3.1.1-100	C, 6
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	A
				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	A

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 4.6.

4. The TLAA designation in the aging management program column indicates that loss of preload due to neutron fluence of the jet pump auxiliary spring wedge assemblies, jet pump restrainer bracket pad repair clamps, and jet pump slip joint clamps is evaluated in Section 4.6.

5. The BWR Vessel Internals (B.2.1.9) program is used to manage loss of preload due to thermal effects and self-loosening of screws and bolts associated with the jet pumps.

6. Loss of material due to wear is applicable to the steam dryer support seismic blocks as identified by operating experience review.

7. 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.

8. The TLAA designation in the aging management program column indicates that fatigue of the jet pump auxiliary spring wedge assemblies is evaluated in Section 4.6.

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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.

- Containment Atmosphere Control System (2.3.2.1)
- Core Spray System (2.3.2.2)
- High Pressure Coolant Injection System (2.3.2.3)
- Reactor Core Isolation Cooling System (2.3.2.4)
- Residual Heat Removal System (2.3.2.5)
- Standby Gas Treatment System (2.3.2.6)

3.2.2 RESULTS

The following tables summarize the results of the aging management review for Engineered Safety Features.

Table 3.2.2-1 Containment Atmosphere Control System Summary of Aging Management Evaluation

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

Table 3.2.2-3 High Pressure Coolant Injection System Summary of Aging Management Evaluation

Table 3.2.2-4 Reactor Core Isolation Cooling System Summary of Aging Management Evaluation

Table 3.2.2-5 Residual Heat Removal System Summary of Aging Management Evaluation

Table 3.2.2-6 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 Containment Atmosphere Control System

Materials

The materials of construction for the Containment Atmosphere Control

System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Glass
- Stainless Steel

Environments

The Containment Atmosphere Control System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air/Gas - Dry
- Air/Gas - Wetted
- Waste Water

Aging Effects Requiring Management

The following aging effects associated with the Containment Atmosphere 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 Containment Atmosphere Control System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)

3.2.2.1.2 Core Spray System

Materials

The materials of construction for the Core Spray System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Cast Austenitic Stainless Steel (CASS)
- Ductile Cast Iron
- Glass
- Gray Cast Iron

- Polymer
- Stainless Steel
- Stainless Steel Bolting
- Zinc

The 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 Core Spray 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 Core Spray System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Lubricating Oil Analysis (B.2.1.27)
- One-Time Inspection (B.2.1.22)
- Selective Leaching (B.2.1.23)
- TLAA
- Water Chemistry (B.2.1.2)

3.2.2.1.3 High Pressure Coolant Injection System

Materials

The materials of construction for the High Pressure Coolant Injection 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

- Glass
- Gray Cast Iron
- Stainless Steel
- Stainless Steel Bolting

Environments

The High Pressure Coolant Injection System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air/Gas - Wetted
- Lubricating Oil
- Steam
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the High Pressure Coolant Injection System components require management:

- Cracking
- 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 High Pressure Coolant Injection System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Flow-Accelerated Corrosion (B.2.1.10)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)
- Lubricating Oil Analysis (B.2.1.27)
- One-Time Inspection (B.2.1.22)
- Selective Leaching (B.2.1.23)
- TLAA

- Water Chemistry (B.2.1.2)

3.2.2.1.4 Reactor Core Isolation Cooling System

Materials

The materials of construction for the Reactor Core Isolation Cooling 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
- Glass
- Gray Cast Iron
- Stainless Steel
- Stainless Steel Bolting

Environments

The Reactor Core Isolation Cooling System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air/Gas - Wetted
- Lubricating Oil
- 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 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)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Flow-Accelerated Corrosion (B.2.1.10)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)
- Lubricating Oil Analysis (B.2.1.27)
- One-Time Inspection (B.2.1.22)
- Selective Leaching (B.2.1.23)
- TLAA
- Water Chemistry (B.2.1.2)

3.2.2.1.5 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
- Copper Alloy with 15% Zinc or More
- Copper Alloy with less than 15% Zinc
- Ductile Cast Iron
- Glass
- Stainless Steel
- Stainless Steel Bolting

Environments

The Residual Heat Removal System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air/Gas - Wetted
- 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.2.1.25)
- Flow-Accelerated Corrosion (B.2.1.10)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)
- Lubricating Oil Analysis (B.2.1.27)
- One-Time Inspection (B.2.1.22)
- TLAA
- Water Chemistry (B.2.1.2)

3.2.2.1.6 Standby Gas Treatment System

Materials

The materials of construction for the Standby Gas Treatment System components are:

- Aluminum
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Copper
- Copper Alloy with 15% Zinc or More
- Elastomer
- Galvanized Steel
- Stainless Steel

Environments

The Standby Gas Treatment System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air/Gas - Wetted

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.2.1.25)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)

3.2.2.2 <u>AMR Results for Which Further Evaluation is Recommended by the GALL Report</u>

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 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 Core Spray, High Pressure Coolant Injection, Reactor Coolant Pressure Boundary, Reactor Core Isolation Cooling, and Residual Heat Removal Systems is discussed in Sections 4.3.1, 4.3.2, and 4.3.3.

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 LGS.

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 only and is not used for LGS.

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.

Item Number 3.2.1-4 is not applicable to LGS. Loss of material due to pitting and crevice corrosion could occur for stainless steel components exposed to an outdoor air environment. Outdoor air is assumed to be an aggressive environment having the potential for the concentration of contaminants that could promote loss of material. For the ESF Systems, there are no components exposed to an outdoor air environment. Therefore, loss of material due to pitting and crevice corrosion is not applicable for ESF Systems at LGS.

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 LGS.

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 LGS. There are no steel spray system flow orifices or nozzles in an uncontrolled indoor air environment in Engineered Safety Features systems at LGS. At LGS, the drywell and suppression chamber spray nozzles are brass.

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.

Item Number 3.2.1-7 is not applicable to LGS. Stress corrosion cracking (SCC) is a mechanism requiring a tensile stress, a corrosive environment, and a susceptible material in order to occur. Outdoor air is assumed to be an aggressive environment having the potential for the concentration of contaminants that could promote SCC. For the ESF Systems, there are no components exposed to an outdoor air environment. Therefore, SSC is not applicable for ESF Systems at LGS.

3.2.2.2.7 Quality Assurance for Aging Management of Non-Safety Related Components

QA provisions applicable to License Renewal are discussed in Section B.1.3.

3.2.2.3 Time-Limited Aging Analysis

The time-limited aging analyses identified below are associated with the Engineered Safety Features components:

- Section 4.3, Metal Fatigue
  - Section 4.3.1, ASME Section III, Class 1 Fatigue Analysis
  - Section 4.3.2, ASME III, Class 2 and 3 and ANSI B31.1 Allowable Stress Calculations
  - Section 4.3.3, Environmental Fatigue Analyses for RPV and Class 1 Piping

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	Not Applicable. See subsection 3.2.2.2.3.2.
3.2.1-5	PWR Only				
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.

Table 3.2.1 Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1-7	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	Not Applicable. 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, 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.
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 High Pressure Coolant Injection, Reactor Core Isolation Cooling, and Residual Heat Removal 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
3.2.1-12	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	Not Applicable. There is no steel high strength closure bolting exposed to air with steam or water leakage in Engineered Safety Features systems.
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 Containment Atmosphere Control, Core Spray, High Pressure Coolant Injection, Reactor Coolant Pressure Boundary, Reactor Core Isolation Cooling, Residual Heat Removal, and Standby Gas Treatment systems.
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.
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 Condenser and Air Removal, Containment Atmosphere Control, Core Spray, High Pressure Coolant Injection, Reactor Core Isolation Cooling, Residual Heat Removal, Reactor Coolant Pressure Boundary and Standby Gas Treatment 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
3.2.1-16	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. The Water Chemistry (B.2.1.2) and One-Time Inspection (B.2.1.22) programs will be used to manage loss of material of the carbon steel, ductile cast iron, and gray cast iron piping, piping components and piping elements, heat exchanger components, and tanks exposed to treated water and steam in the Core Spray, High Pressure Coolant Injection, Reactor Coolant Pressure Boundary, Reactor Core Isolation Cooling, and Residual Heat Removal systems. The Bolting Integrity (B.2.1.11) program has been substituted and will be used to manage loss of material of the carbon and low alloy steel bolting exposed to treated water in the Condenser and Air Removal, Core Spray, High Pressure Coolant Injection, Reactor Core Isolation Cooling, and Residual Heat Removal 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
3.2.1-17	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. The Water Chemistry (B.2.1.2) and One-Time Inspection (B.2.1.22) programs will be used to manage loss of material of the stainless steel and cast austenitic stainless steel piping, piping components and piping elements, and heat exchanger components, exposed to treated water and steam in Core Spray, High Pressure Coolant Injection, Reactor Coolant Pressure Boundary, Reactor Core Isolation Cooling, and Residual Heat Removal systems. The Bolting Integrity (B.2.1.11) program has been substituted and will be used to manage loss of material of the stainless steel bolting exposed to treated water in the Core Spray, High Pressure Coolant Injection, Reactor Core Isolation Cooling, and Residual Heat Removal systems.
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. There are no stainless steel containment isolation piping and components exposed to treated water in Engineered Safety Features systems.
3.2.1-19	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. The Water Chemistry (B.2.1.2) and One-Time Inspection (B.2.1.22) programs 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.

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
3.2.1-20	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	Consistent with NUREG-1801. The Open-Cycle Cooling Water System (B.2.1.12) program will be used to manage loss of material of the carbon steel piping, piping components, and piping elements exposed to raw water in the Water Treatment and Distribution system.
3.2.1-24	PWR Only				
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	Consistent with NUREG-1801. The Open-Cycle Cooling Water System (B.2.1.12) 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, exposed to raw water in the Safety Related Service Water system. The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36) program has been substituted and will be used to manage loss of material of the stainless steel miscellaneous steel and metal components exposed to raw water in the Spray Pond and Pump House.

Table 3.2.1 Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1-26	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. Reduction of heat transfer of stainless steel Residual Heat Removal heat exchanger components exposed to raw water is evaluated in Auxiliary Systems Table 3.3.1, Item Number 3.3.1-42.
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. Reduction of heat transfer of stainless steel Residual Heat Removal heat exchanger components exposed to raw water is evaluated in Auxiliary Systems Table 3.3.1, Item Number 3.3.1-42.
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.
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	Not Applicable. There are no steel heat exchanger components 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
3.2.1-31	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, 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	Not Applicable. There are no copper alloy heat exchanger components, piping, piping components, and piping elements exposed to closed-cycle cooling water in Engineered Safety Features systems.
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.
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, and heat exchanger components 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
3.2.1-35	Gray cast iron Motor cooler exposed to Treated water	Loss of material due to selective leaching	Chapter XI.M33, "Selective Leaching"	No	Consistent with NUREG-1801. The Selective Leaching (B.2.1.23) program will be used to manage loss of material of the gray cast iron piping, piping components, and piping elements exposed to treated water in the Core Spray and High Pressure Coolant Injection systems.
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.2.1.25) 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.
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 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, 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.2.1.25) program will be used to manage loss of material of the carbon steel, gray cast iron, and carbon and low alloy steel bolting, ducting and components, piping, piping components and piping elements, Class 1 piping, fittings and branch connections < 4-inch nominal pipe size, reactor vessel external attachments, and tanks exposed to air – indoor, uncontrolled in the Containment Atmosphere Control, Core Spray, High Pressure Coolant Injection, Reactor Coolant Pressure Boundary, Reactor Core Isolation Cooling, Reactor Pressure Vessel, Residual Heat Removal, and Standby Gas Treatment systems.
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.

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
3.2.1-43	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.
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, ducting and components with internal surfaces exposed to air – indoor, uncontrolled in Engineered Safety Features systems. Internal air environments are evaluated as a condensation environment in Item Number 3.2.1-46.
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.2.1.26) program will be used to manage loss of material of the carbon steel, galvanized steel and gray cast iron piping and components and ducting and components exposed to air/gas – wetted in the Containment Atmosphere Control, High Pressure Coolant Injection, Reactor Core Isolation Cooling, Residual Heat Removal, and Standby Gas Treatment systems.
3.2.1-47	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
3.2.1-48	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.2.1.26) program will be used to manage loss of material of stainless steel piping, piping components, and piping elements, tanks, and ducting and components exposed to air/gas – wetted in the Containment Atmosphere Control, Residual Heat Removal, Standby Gas Treatment, and Standby Liquid Control systems.
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.2.1.27) and One-Time Inspection (B.2.1.22) programs will be used to manage loss of material of the carbon steel and gray cast iron piping, piping components, and piping elements and tanks exposed to lubricating oil in the Core Spray, High Pressure Coolant Injection, and Reactor Core Isolation Cooling systems.
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.2.1.27) and One-Time Inspection (B.2.1.22) programs will be used to manage loss of material of the of the copper alloy and stainless steel piping, piping components, and piping elements and heat exchanger components exposed to lubricating oil in the High Pressure Coolant Injection, Reactor Core Isolation Cooling, and Residual Heat Removal 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
3.2.1-51	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.2.1.27) and One-Time Inspection (B.2.1.22) programs 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 Emergency Diesel Generator, High Pressure Coolant Injection, Reactor Core Isolation Cooling, and Residual Heat Removal systems.
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 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 piping, piping components, and piping elements exposed to soil or concrete in Engineered Safety Features systems.
3.2.1-53x	Steel; stainless steel 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 or stainless steel underground piping, piping components, and piping elements exposed to air – indoor, uncontrolled or condensation 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. The BWR Stress Corrosion Cracking (B.2.1.7) and Water Chemistry (B.2.1.2) programs 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. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1) program has been substituted for the BWR Stress Corrosion Cracking (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 in the Reactor Coolant Pressure Boundary system.
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.

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
3.2.1-56	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.
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	Consistent with NUREG-1801.
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.

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
3.2.1-61	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 in Engineered Safety Features systems.
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.

Table 3.2.2-1
Containment Atmosphere Control System
Summary of Aging Management Evaluation

Table 3.2.2-1 Containment Atmosphere 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)	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
Flow Device (Gas Analyzers - Orifices)	Pressure Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.EP-61	3.2.1-48	A
	Throttle	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.EP-61	3.2.1-48	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.2.1.25)	V.E.E-44	3.2.1-40	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A

Table 3.2.2-1 Containment Atmosphere 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	Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.EP-61	3.2.1-48	A
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.E.E-44	3.2.1-40	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.EP-61	3.2.1-48	A
Piping, piping components, and piping elements (Gas Analyzers)	Pressure Boundary	Glass	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-15	3.2.1-60	A
			Air/Gas - Dry (Internal)	None	None	V.F.EP-67	3.2.1-60	A
			Air/Gas - Wetted (Internal)	None	None	V.F.EP-66	3.2.1-60	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Air/Gas - Dry (Internal)	None	None	V.F.EP-22	3.2.1-63	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.EP-61	3.2.1-48	A
Piping, piping components, and piping elements (Recombiner)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.E.E-44	3.2.1-40	A

Table 3.2.2-1 Containment Atmosphere 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 (Recombiner)	Leakage Boundary	Carbon Steel	Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-281	3.3.1-91	A
		Glass	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-15	3.2.1-60	A
			Air/Gas - Wetted (Internal)	None	None	V.F.EP-66	3.2.1-60	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	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.2.1.26)	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.2.1.25)	V.E.E-44	3.2.1-40	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-281	3.3.1-91	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A

Table 3.2.2-1 Containment Atmosphere 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 (Recombiner)	Pressure Boundary	Stainless Steel	Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	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.2.1.26)	VII.E5.AP-278	3.3.1-95	A
Pump Casing (Gas Analyzers)	Pressure Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.EP-61	3.2.1-48	A
Pump Casing (Recombiner Blower Casing)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.E.E-44	3.2.1-40	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	A
Sensor Element (H2/O2 Elements)	Pressure Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.EP-61	3.2.1-48	A
Valve Body	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.E.E-44	3.2.1-40	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	A

Table 3.2.2-1 Containment Atmosphere 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	Pressure Boundary	Carbon Steel	Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-281	3.3.1-91	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	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.2.1.26)	VII.E5.AP-278	3.3.1-95	A
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.E.E-44	3.2.1-40	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	A
Valve Body (Gas Analyzers)	Pressure Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Air/Gas - Dry (Internal)	None	None	V.F.EP-22	3.2.1-63	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.EP-61	3.2.1-48	A

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 3.2.2-2
Core Spray System
Summary of Aging Management Evaluation

Table 3.2.2-2 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
			Treated Water (External)	Loss of Material	Bolting Integrity (B.2.1.11)	V.D2.EP-60	3.2.1-16	E, 1, 2
				Loss of Preload	Bolting Integrity (B.2.1.11)	V.E.EP-122	3.2.1-15	A, 1
		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	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.E.E-44	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	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
	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.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
	Throttle	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A

Table 3.2.2-2 Core Spray 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	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	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.2.1.25)	V.E.E-44	3.2.1-40	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.22)	V.D2.EP-77	3.2.1-49	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	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.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.E.E-44	3.2.1-40	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.22)	V.D2.EP-77	3.2.1-49	A
			Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A, 1
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A, 1
			Treated Water (Internal)	Cumulative Fatigue Damage	TLAA	V.D2.E-10	3.2.1-1	A, 6
				Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A

Table 3.2.2-2 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	Carbon Steel	Treated Water (Internal)	Loss of Material	Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
		Polymer	Air - Indoor, Uncontrolled (External)	None	None			F, 4
			Lubricating Oil (Internal)	None	None			F, 4
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A, 1
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A, 1
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
		Zinc	Air - Indoor, Uncontrolled (External)	None	None			F, 5
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)			F, 5
					One-Time Inspection (B.2.1.22)			F, 5
Pump Casing (Core Spray)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.E.E-44	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
		Ductile Cast Iron	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A, 3
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A, 3
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A

Table 3.2.2-2 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 (Safeguard Fill)	Pressure Boundary	Cast Austenitic Stainless Steel (CASS)	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.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
Pump Casing (Suppression Pool Cleanup)	Leakage Boundary	Gray Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.E.E-44	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
					Selective Leaching (B.2.1.23)	V.D1.E-43	3.2.1-35	C
Strainer (Element)	Filter	Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A, 1
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A, 1
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
	Pressure Boundary	Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A, 1
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A, 1
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.E.E-44	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A

Table 3.2.2-2 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	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.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.E.E-44	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	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.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A

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 ECCS 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.
3. The Core Spray pump is comprised of a ductile iron casting contained within a carbon steel shell. The ductile iron casting is submerged in treated water within the carbon steel shell.
4. Component is butyrate plastic. Butyrate plastic has no aging effects in air-indoor (external) and lubricating oil (internal) environments.
5. Component is zinc die cast and has no aging effects in an air-indoor (external) environment. In a lubricating oil (internal) environment, the component is susceptible to loss of material.
6. 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
High Pressure Coolant Injection System
Summary of Aging Management Evaluation

Table 3.2.2-3 High Pressure Coolant Injection 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
			Treated Water (External)	Loss of Material	Bolting Integrity (B.2.1.11)	V.D2.EP-60	3.2.1-16	E, 1, 2
				Loss of Preload	Bolting Integrity (B.2.1.11)	V.E.EP-122	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
Flow Device	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	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
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.22)	V.D2.EP-77	3.2.1-49	A

Table 3.2.2-3 High Pressure Coolant Injection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Flow Device	Pressure Boundary	Carbon Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	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
	Throttle	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
Heat Exchanger Components (Lube Oil Cooler - shell side)	Pressure Boundary	Copper Alloy with 15% Zinc or More	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.2.1.27)	V.D2.EP-76	3.2.1-50	C
					One-Time Inspection (B.2.1.22)	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.2.1.27)	V.D2.EP-76	3.2.1-50	C
					One-Time Inspection (B.2.1.22)	V.D2.EP-76	3.2.1-50	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.A.SP-101	3.4.1-16	C
					Water Chemistry (B.2.1.2)	VIII.A.SP-101	3.4.1-16	C

Table 3.2.2-3 High Pressure Coolant Injection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger Components (Lube Oil Cooler - tube side components)	Pressure Boundary	Copper Alloy with less than 15% Zinc	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-10	3.2.1-57	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.A.SP-101	3.4.1-16	C
					Water Chemistry (B.2.1.2)	VIII.A.SP-101	3.4.1-16	C
Heat Exchanger Components (Lube Oil Cooler - tubes)	Heat Transfer	Copper Alloy with 15% Zinc or More	Lubricating Oil (External)	Reduction of Heat Transfer	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-78	3.2.1-51	A
					One-Time Inspection (B.2.1.22)	V.D2.EP-78	3.2.1-51	A
			Treated Water (Internal)	Reduction of Heat Transfer	One-Time Inspection (B.2.1.22)	VIII.E.SP-100	3.4.1-18	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-100	3.4.1-18	A
	Pressure Boundary	Copper Alloy with 15% Zinc or More	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-76	3.2.1-50	C
					One-Time Inspection (B.2.1.22)	V.D2.EP-76	3.2.1-50	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.A4.AP-140	3.3.1-22	C
					Selective Leaching (B.2.1.23)	VII.F1.AP-65	3.3.1-72	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-140	3.3.1-22	C
Heat Exchanger Components (Lube Oil Cooler - tubesheet)	Pressure Boundary	Copper Alloy with less than 15% Zinc	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-76	3.2.1-50	C
					One-Time Inspection (B.2.1.22)	V.D2.EP-76	3.2.1-50	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.A.SP-101	3.4.1-16	C
					Water Chemistry (B.2.1.2)	VIII.A.SP-101	3.4.1-16	C

Table 3.2.2-3 High Pressure Coolant Injection 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.2.1.25)	V.D2.E-26	3.2.1-40	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	A
			Steam (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-07	3.2.1-11	A, 3
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.22)	V.D2.EP-77	3.2.1-49	A
			Steam (Internal)	Cumulative Fatigue Damage	TLAA	VIII.B2.S-08	3.4.1-1	A, 4
				Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-07	3.2.1-11	A, 3

Table 3.2.2-3 High Pressure Coolant Injection 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)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
			Treated Water (Internal)	Cumulative Fatigue Damage	TLAA	V.D2.E-10	3.2.1-1	A, 4
				Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D1.EP-80	3.2.1-50	A
					One-Time Inspection (B.2.1.22)	V.D1.EP-80	3.2.1-50	A
			Steam (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VIII.B2.SP-98	3.4.1-11	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-98	3.4.1-11	A
				Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	A

Table 3.2.2-3 High Pressure Coolant Injection 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	Structural Support	Gray Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	A
Pump Casing (Aux Lube Oil)	Pressure Boundary	Gray Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.22)	V.D2.EP-77	3.2.1-49	A
Pump Casing (Barometric condenser vacuum pump)	Structural Support	Gray Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Selective Leaching (B.2.1.23)	V.A.E-43	3.2.1-35	C
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
Pump Casing (Booster Pump)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
Pump Casing (HPCI Pump)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A

Table 3.2.2-3 High Pressure Coolant Injection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Pump Casing (HPCI Pump)	Pressure Boundary	Carbon Steel	Treated Water (Internal)	Loss of Material	Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
Pump Casing (Turbine driven lube oil pump)	Pressure Boundary	Gray Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.22)	V.D2.EP-77	3.2.1-49	A
Pump Casing (Vacuum tank condensate pump)	Leakage Boundary	Gray Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Selective Leaching (B.2.1.23)	V.A.E-43	3.2.1-35	C
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
Sparger	Pressure Boundary	Carbon Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
Strainer (Element)	Filter	Carbon Steel	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.22)	V.D2.EP-77	3.2.1-49	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.22)	V.D2.EP-77	3.2.1-49	A

Table 3.2.2-3 High Pressure Coolant Injection 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	Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
	Pressure Boundary	Carbon Steel	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.22)	V.D2.EP-77	3.2.1-49	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.22)	V.D2.EP-77	3.2.1-49	A
		Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
Tank (Turbine Lube Oil Reservoirs)	Pressure Boundary	Gray Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.E.E-44	3.2.1-40	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.22)	V.D2.EP-77	3.2.1-49	A
Tank (Vacuum Tank)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.E.E-44	3.2.1-40	A

Table 3.2.2-3 High Pressure Coolant Injection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Tank (Vacuum Tank)	Leakage Boundary	Carbon Steel	Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
Turbine Casings	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	A
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-77	3.2.1-49	A

Table 3.2.2-3 High Pressure Coolant Injection 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	Lubricating Oil (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-77	3.2.1-49	A
			Steam (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-07	3.2.1-11	A, 3
			Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	A

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 ECCS 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.
3. The HPCI Steam Supply Drain lines are susceptible to FAC and are included in the scope of the Flow-Accelerated Corrosion (B.2.1.10) program.
4. The TLAA designation in the Aging Management Program column indicates that fatigue of this component is evaluated in Section 4.3.

Table 3.2.2-4
Reactor Core Isolation Cooling System
Summary of Aging Management Evaluation

Table 3.2.2-4 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
			Treated Water (External)	Loss of Material	Bolting Integrity (B.2.1.11)	V.D2.EP-60	3.2.1-16	E, 1, 2
				Loss of Preload	Bolting Integrity (B.2.1.11)	V.E.EP-122	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
Flow Device	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	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
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.22)	V.D2.EP-77	3.2.1-49	A

Table 3.2.2-4 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
Flow Device	Pressure Boundary	Carbon Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	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
	Throttle	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
Heat Exchanger Components (Lube Oil Cooler - shell side)	Pressure Boundary	Copper Alloy with 15% Zinc or More	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.2.1.27)	V.D2.EP-76	3.2.1-50	C
					One-Time Inspection (B.2.1.22)	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.2.1.27)	V.D2.EP-76	3.2.1-50	C
					One-Time Inspection (B.2.1.22)	V.D2.EP-76	3.2.1-50	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.A.SP-101	3.4.1-16	C
					Water Chemistry (B.2.1.2)	VIII.A.SP-101	3.4.1-16	C

Table 3.2.2-4 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 Components (Lube Oil Cooler - tube side components)	Pressure Boundary	Copper Alloy with less than 15% Zinc	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-10	3.2.1-57	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.A.SP-101	3.4.1-16	C
					Water Chemistry (B.2.1.2)	VIII.A.SP-101	3.4.1-16	C
Heat Exchanger Components (Lube Oil Cooler - tubes)	Heat Transfer	Copper Alloy with 15% Zinc or More	Lubricating Oil (External)	Reduction of Heat Transfer	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-78	3.2.1-51	A
					One-Time Inspection (B.2.1.22)	V.D2.EP-78	3.2.1-51	A
			Treated Water (Internal)	Reduction of Heat Transfer	One-Time Inspection (B.2.1.22)	VIII.E.SP-100	3.4.1-18	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-100	3.4.1-18	A
	Pressure Boundary	Copper Alloy with 15% Zinc or More	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-76	3.2.1-50	C
					One-Time Inspection (B.2.1.22)	V.D2.EP-76	3.2.1-50	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.A4.AP-140	3.3.1-22	C
					Selective Leaching (B.2.1.23)	VII.F1.AP-65	3.3.1-72	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-140	3.3.1-22	C
Heat Exchanger Components (Lube Oil Cooler - tubesheet)	Pressure Boundary	Copper Alloy with less than 15% Zinc	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-76	3.2.1-50	C
					One-Time Inspection (B.2.1.22)	V.D2.EP-76	3.2.1-50	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.A.SP-101	3.4.1-16	C
					Water Chemistry (B.2.1.2)	VIII.A.SP-101	3.4.1-16	C

Table 3.2.2-4 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	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	A
			Steam (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-07	3.2.1-11	A, 3
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.22)	V.D2.EP-77	3.2.1-49	A
			Steam (Internal)	Cumulative Fatigue Damage	TLAA	VIII.B2.S-08	3.4.1-1	A, 4
				Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-07	3.2.1-11	A, 3

Table 3.2.2-4 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	Carbon Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
			Treated Water (Internal)	Cumulative Fatigue Damage	TLAA	V.D2.E-10	3.2.1-1	A, 4
				Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D1.EP-80	3.2.1-50	A
					One-Time Inspection (B.2.1.22)	V.D1.EP-80	3.2.1-50	A
			Steam (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VIII.B2.SP-98	3.4.1-11	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-98	3.4.1-11	A
				Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
Pump Casing (Barometric Condenser Pump)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A

Table 3.2.2-4 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 (RCIC Pump)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
Pump Casing (Turbine driven lube oil pump)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.22)	V.D2.EP-77	3.2.1-49	A
Sparger	Pressure Boundary	Carbon Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
Strainer (Element)	Filter	Carbon Steel	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.22)	V.D2.EP-77	3.2.1-49	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.22)	V.D2.EP-77	3.2.1-49	A
		Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A

Table 3.2.2-4 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	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
	Pressure Boundary	Carbon Steel	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.22)	V.D2.EP-77	3.2.1-49	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.22)	V.D2.EP-77	3.2.1-49	A
		Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
Tank (Vacuum Tank)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.E.E-44	3.2.1-40	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
Tanks (Turbine Lube Oil Reservoirs)	Pressure Boundary	Gray Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.E.E-44	3.2.1-40	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.22)	V.D2.EP-77	3.2.1-49	A

Table 3.2.2-4 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
Turbine Casings	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	A
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.D2.E-26	3.2.1-40	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-77	3.2.1-49	A
					One-Time Inspection (B.2.1.22)	V.D2.EP-77	3.2.1-49	A
			Steam (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	V.D2.E-07	3.2.1-11	A, 3

Table 3.2.2-4 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	Carbon Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A

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 ECCS suction strainer assemblies.
2. The Bolting Integrity (B.2.11) program is substituted to manage the aging effect applicable to this component type, material, and environment combination.
3. The RCIC Steam Supply Drain lines are susceptible to FAC and are included in the scope of the Flow Accelerated Corrosion (B.2.1.10) program.
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
Residual Heat Removal System
Summary of Aging Management Evaluation

Table 3.2.2-5 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
			Treated Water (External)	Loss of Material	Bolting Integrity (B.2.1.11)	V.D2.EP-60	3.2.1-16	E, 1, 2
				Loss of Preload	Bolting Integrity (B.2.1.11)	V.E.EP-122	3.2.1-15	A, 1
		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	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.E.E-44	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	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
	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.2.1.22)	V.D2.EP-73	3.2.1-17	A

Table 3.2.2-5 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	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
	Throttle	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.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
Heat Exchanger Components (RHR heat exchanger - shell side)	Heat Transfer	Stainless Steel	Treated Water (External)	Reduction of Heat Transfer	One-Time Inspection (B.2.1.22)	V.D2.EP-74	3.2.1-19	A
					Water Chemistry (B.2.1.2)	V.D2.EP-74	3.2.1-19	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.H2.AP-41	3.3.1-80	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	C
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	C
		Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
Heat Exchanger Components (RHR pump motor cooling coil)	Heat Transfer	Copper Alloy with less than 15% Zinc	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-76	3.2.1-50	C
					One-Time Inspection (B.2.1.22)	V.D2.EP-76	3.2.1-50	C
				Reduction of Heat Transfer	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-78	3.2.1-51	A
					One-Time Inspection (B.2.1.22)	V.D2.EP-78	3.2.1-51	A
		Stainless Steel	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D1.EP-80	3.2.1-50	C

Table 3.2.2-5 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
Heat Exchanger Components (RHR pump motor cooling coil)	Heat Transfer	Stainless Steel	Lubricating Oil (External)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D1.EP-80	3.2.1-50	C
				Reduction of Heat Transfer	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-79	3.2.1-51	A
					One-Time Inspection (B.2.1.22)	V.D2.EP-79	3.2.1-51	A
	Pressure Boundary	Copper Alloy with less than 15% Zinc	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-76	3.2.1-50	C
					One-Time Inspection (B.2.1.22)	V.D2.EP-76	3.2.1-50	C
		Stainless Steel	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	V.D1.EP-80	3.2.1-50	C
					One-Time Inspection (B.2.1.22)	V.D1.EP-80	3.2.1-50	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.2.1.25)	V.E.E-44	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.EP-61	3.2.1-48	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A

Table 3.2.2-5 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	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.E.E-44	3.2.1-40	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	A
			Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A, 1
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A, 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.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
				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
			Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A, 1
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A, 1
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
Pump Casing	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.E.E-44	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A

Table 3.2.2-5 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
Pump Casing	Pressure Boundary	Ductile Cast Iron	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A, 3
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A, 3
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A, 3
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A, 3
Spray Nozzles	Spray	Copper Alloy with 15% Zinc or More	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-10	3.2.1-57	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	A
Strainer (Element)	Filter	Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A, 1
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A, 1
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
	Pressure Boundary	Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A, 1
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A, 1
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.E.E-44	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	A

Table 3.2.2-5 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	Leakage Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.E.E-44	3.2.1-40	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-60	3.2.1-16	A
					Water Chemistry (B.2.1.2)	V.D2.EP-60	3.2.1-16	A
				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
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	V.D2.EP-73	3.2.1-17	A
					Water Chemistry (B.2.1.2)	V.D2.EP-73	3.2.1-17	A

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 in the Treated Water (External) environment include those associated with the submerged ECCS suction strainer assemblies.
2. The Bolting Integrity (B.2.1.11) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination.
3. The RHR pump is comprised of a ductile iron casting contained within a carbon steel shell. The ductile iron casting is submerged in treated water within the carbon steel shell.
4. The TLAA designation in the Aging Management Program column indicates that fatigue of this component is evaluated in Section 4.3.

Table 3.2.2-6
Standby Gas Treatment System
Summary of Aging Management Evaluation

Table 3.2.2-6 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	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.B.E-40	3.2.1-40	A
					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
Ducting and Components	Pressure Boundary	Aluminum	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-3	3.2.1-56	C
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	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.2.1.25)	V.B.E-26	3.2.1-40	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	C
		Elastomer	Air - Indoor, Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.B.EP-59	3.2.1-38	A
			Air/Gas - Wetted (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			G
		Galvanized Steel	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-14	3.2.1-59	A

Table 3.2.2-6 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	Galvanized Steel	Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	C
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-18	3.2.1-63	C
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.EP-61	3.2.1-48	C
Flexible Connection	Pressure Boundary	Elastomer	Air - Indoor, Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.B.EP-59	3.2.1-38	A
				Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F1.AP-113	3.3.1-82	A
			Air/Gas - Wetted (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			G
				Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			G
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.B.E-26	3.2.1-40	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.B.E-26	3.2.1-40	A

Table 3.2.2-6 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	Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.E-27	3.2.1-46	A
		Copper	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-10	3.2.1-57	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	A
		Copper Alloy with 15% Zinc or More	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-10	3.2.1-57	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	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
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.EP-61	3.2.1-48	A
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	V.B.E-26	3.2.1-40	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	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.2.1.25)	V.B.E-26	3.2.1-40	A

Table 3.2.2-6 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	Carbon Steel	Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	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
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	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
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.D2.EP-61	3.2.1-48	A

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.

3.3 AGING MANAGEMENT OF AUXILIARY SYSTEMS

3.3.1 INTRODUCTION

This section provides the results of the aging management review for those components identified in Section 2.3.3, Auxiliary Systems, as being subject to aging management review. The systems, or portions of systems, which are addressed in this section are described in the indicated sections.

- Auxiliary Steam System (2.3.3.1)
- Closed Cooling Water System (2.3.3.2)
- Compressed Air System (2.3.3.3)
- Control Enclosure Ventilation System (2.3.3.4)
- Control Rod Drive System (2.3.3.5)
- Cranes and Hoists (2.3.3.6)
- Emergency Diesel Generator Enclosure Ventilation System (2.3.3.7)
- Emergency Diesel Generator System (2.3.3.8)
- Fire Protection System (2.3.3.9)
- Fuel Handling and Storage (2.3.3.10)
- Fuel Pool Cooling and Cleanup System (2.3.3.11)
- Nonsafety-Related Service Water System (2.3.3.12)
- Plant Drainage System (2.3.3.13)
- Primary Containment Instrument Gas System (2.3.3.14)
- Primary Containment Leak Testing System (2.3.3.15)
- Primary Containment Ventilation System (2.3.3.16)
- Process Radiation Monitoring System (2.3.3.17)
- Process and Post-Accident Sampling System (2.3.3.18)
- Radwaste System (2.3.3.19)
- Reactor Enclosure Ventilation System (2.3.3.20)
- Reactor Water Cleanup System (2.3.3.21)
- Safety Related Service Water System (2.3.3.22)
- Spray Pond Pump House Ventilation System (2.3.3.23)
- Standby Liquid Control System (2.3.3.24)
- Traversing Incore Probe System (2.3.3.25)
- Water Treatment and Distribution System (2.3.3.26)

3.3.2 RESULTS

The following tables summarize the results of the aging management review for Auxiliary Systems.

Table 3.3.2-1 Auxiliary Steam System Summary of Aging Management Evaluation

Table 3.3.2-2 Closed Cooling Water 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 Enclosure Ventilation System Summary of Aging Management Evaluation

Table 3.3.2-5 Control Rod Drive System Summary of Aging Management Evaluation

Table 3.3.2-6 Cranes and Hoists Summary of Aging Management Evaluation

Table 3.3.2-7 Emergency Diesel Generator Enclosure Ventilation System Summary of Aging Management Evaluation

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

Table 3.3.2-9 Fire Protection System Summary of Aging Management Evaluation

Table 3.3.2-10 Fuel Handling and Storage Summary of Aging Management Evaluation

Table 3.3.2-11 Fuel Pool Cooling and Cleanup System Summary of Aging Management Evaluation

Table 3.3.2-12 Nonsafety-Related Service Water System Summary of Aging Management Evaluation

Table 3.3.2-13 Plant Drainage System Summary of Aging Management Evaluation

Table 3.3.2-14 Primary Containment Instrument Gas System Summary of Aging Management Evaluation

Table 3.3.2-15 Primary Containment Leak Testing System Summary of Aging Management Evaluation

Table 3.3.2-16 Primary Containment Ventilation System Summary of Aging Management Evaluation

Table 3.3.2-17 Process Radiation Monitoring System Summary of Aging Management Evaluation

Table 3.3.2-18 Process and Post-Accident Sampling System Summary of Aging

3.3.2.1 Materials, Environments, Aging Effects Requiring Management And Aging Management Programs

3.3.2.1.1 Auxiliary Steam System

Materials

The materials of construction for the Auxiliary Steam 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
- Glass
- Stainless Steel

Environments

The Auxiliary Steam 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 Auxiliary 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 Auxiliary Steam System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Flow-Accelerated Corrosion (B.2.1.10)
- One-Time Inspection (B.2.1.22)
- Selective Leaching (B.2.1.23)
- TLAA
- Water Chemistry (B.2.1.2)

3.3.2.1.2 Closed Cooling Water System

Materials

The materials of construction for the Closed Cooling Water System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Copper
- Copper Alloy with 15% Zinc or More
- Glass
- Gray Cast Iron
- Stainless Steel

Environments

The Closed Cooling Water System components are exposed to the following environments:

- Air - Indoor, Uncontrolled

- Air/Gas - Wetted
- Closed Cycle Cooling Water
- Lubricating Oil

Aging Effects Requiring Management

The following aging effects associated with the Closed Cooling Water System components require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Closed 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.2.1.25)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)
- Lubricating Oil Analysis (B.2.1.27)
- One-Time Inspection (B.2.1.22)
- Selective Leaching (B.2.1.23)

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
- Copper Alloy with less than 15% Zinc
- Elastomer
- Stainless Steel

Environments

The Compressed Air System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air/Gas - Wetted

Aging Effects Requiring Management

The following aging effects associated with the Compressed Air 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 Compressed Air System components:

- Bolting Integrity (B.2.1.11)
- Compressed Air Monitoring (B.2.1.15)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)

3.3.2.1.4 Control Enclosure Ventilation System

Materials

The materials of construction for the Control Enclosure Ventilation System components are:

- Aluminum
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Copper
- Copper Alloy with 15% Zinc or More
- Copper Alloy with less than 15% Zinc
- Elastomer
- Galvanized Steel
- Glass
- Stainless Steel
- Stainless Steel Bolting

Environments

The Control Enclosure Ventilation System components are exposed to the following environments:

- Air - Indoor, Uncontrolled

- Air/Gas - Dry
- Air/Gas - Wetted
- Closed Cycle Cooling Water
- Lubricating Oil
- Waste Water

Aging Effects Requiring Management

The following aging effects associated with the Control Enclosure 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 Enclosure Ventilation System components:

- Bolting Integrity (B.2.1.11)
- Closed Treated Water Systems (B.2.1.13)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)
- Lubricating Oil Analysis (B.2.1.27)
- One-Time Inspection (B.2.1.22)

3.3.2.1.5 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
- Cast Austenitic Stainless Steel (CASS)
- Glass
- Stainless Steel

Environments

The Control Rod Drive System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air/Gas - Wetted
- Treated 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.2.1.25)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)
- One-Time Inspection (B.2.1.22)
- TLAA
- Water Chemistry (B.2.1.2)

3.3.2.1.6 Cranes and Hoists

Materials

The materials of construction for the Cranes and Hoists components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting

Environment

The Cranes and Hoists components are exposed to the following environment:

- Air - Indoor, Uncontrolled

Aging Effects Requiring Management

The following aging effects associated with the Cranes and Hoists 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 and Hoists components:

- Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.2.1.14)
- TLAA

3.3.2.1.7 Emergency Diesel Generator Enclosure Ventilation System

Materials

The materials of construction for the Emergency Diesel Generator Enclosure Ventilation System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Elastomer
- Galvanized Steel

Environments

The Emergency Diesel Generator Enclosure Ventilation System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air/Gas - Wetted

Aging Effects Requiring Management

The following aging effects associated with the Emergency Diesel Generator Enclosure Ventilation System components require management:

- Hardening and Loss of Strength
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Emergency Diesel Generator Enclosure Ventilation System components:

- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)

3.3.2.1.8 Emergency Diesel Generator System

Materials

The materials of construction for the Emergency Diesel Generator System components are:

- Aluminum
- 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
- Elastomer
- Glass
- Gray Cast Iron
- Stainless Steel
- Stainless Steel Bolting

Environments

The Emergency Diesel Generator System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air - Outdoor
- Air/Gas - Wetted
- Closed Cycle Cooling Water
- Diesel Exhaust
- Fuel Oil
- Lubricating Oil
- Raw Water
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Emergency Diesel Generator 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 Emergency Diesel Generator System components:

- Bolting Integrity (B.2.1.11)
- Buried and Underground Piping and Tanks (B.2.1.29)
- Closed Treated Water Systems (B.2.1.13)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Fuel Oil Chemistry (B.2.1.20)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)
- Lubricating Oil Analysis (B.2.1.27)
- One-Time Inspection (B.2.1.22)
- Selective Leaching (B.2.1.23)
- TLAA

3.3.2.1.9 Fire Protection System

Materials

The materials of construction for the Fire Protection System components are:

- Aluminum
- Cafecote
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Cement
- Concrete
- Copper Alloy with 15% Zinc or More
- Copper Alloy with less than 15% Zinc
- Darmatt
- Ductile Cast Iron
- Elastomer

- Galvanized Steel
- Glass
- Gray Cast Iron
- Grout
- Polymer
- Soil (Asphalt covered)
- Stainless Steel
- Thermolag

Environments

The Fire Protection System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air - Outdoor
- Air/Gas - Dry
- Air/Gas - Wetted
- Diesel Exhaust
- Fuel Oil
- Raw Water
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Fire Protection System components require management:

- Concrete cracking and spalling
- Cracking
- Cracking and spalling
- Cumulative Fatigue Damage
- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload
- Loss of Material or Loss of Form

Aging Management Programs

The following aging management programs manage the aging effects for the Fire Protection System components:

- Aboveground Metallic Tanks (B.2.1.19)
- Bolting Integrity (B.2.1.11)
- Buried and Underground Piping and Tanks (B.2.1.29)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Fire Protection (B.2.1.17)
- Fire Water System (B.2.1.18)
- Fuel Oil Chemistry (B.2.1.20)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)
- One-Time Inspection (B.2.1.22)
- Selective Leaching (B.2.1.23)
- Structures Monitoring (B.2.1.35)
- TLAA

3.3.2.1.10 Fuel Handling and Storage

Materials

The materials of construction for the Fuel Handling and Storage components are:

- Aluminum Alloy
- Boral
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Nickel Alloy
- Stainless Steel
- Stainless Steel Bolting

Environments

The Fuel Handling and Storage components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Treated Water

Aging Effect Requiring Management

The following aging effects associated with the Fuel Handling and Storage 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 Handling and Storage components:

- Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.2.1.14)
- Monitoring of Neutron-Absorbing Materials Other Than Boraflex (B.2.1.28)
- One-Time Inspection (B.2.1.22)
- Water Chemistry (B.2.1.2)

3.3.2.1.11 Fuel Pool Cooling and Cleanup System

Materials

The materials of construction for the Fuel Pool Cooling and Cleanup System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Cast Austenitic Stainless Steel (CASS)
- Copper Alloy with less than 15% Zinc
- Elastomer
- Galvanized Steel
- Glass
- Nickel Alloy
- Stainless Steel
- Stainless Steel Bolting

Environments

The Fuel Pool Cooling and Cleanup System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air/Gas - Wetted
- Concrete (Embedded)
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Fuel Pool Cooling and Cleanup 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 Fuel Pool Cooling and Cleanup System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)
- One-Time Inspection (B.2.1.22)
- Water Chemistry (B.2.1.2)

3.3.2.1.12 Nonsafety-Related Service Water System

Materials

The materials of construction for the Nonsafety-Related Service Water System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Cast Austenitic Stainless Steel (CASS)
- Copper
- Copper Alloy
- Copper Alloy with 15% Zinc or More
- Ductile Cast Iron
- Glass
- Gray Cast Iron
- Stainless Steel
- Stainless Steel Bolting

Environments

The Nonsafety-Related Service Water System components are exposed to the following environments:

- Air - Indoor, Uncontrolled

- Air/Gas - Wetted
- Lubricating Oil
- Raw Water

Aging Effects Requiring Management

The following aging effects associated with the Nonsafety-Related Service Water 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 Service Water System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)
- Lubricating Oil Analysis (B.2.1.27)
- One-Time Inspection (B.2.1.22)
- Open-Cycle Cooling Water System (B.2.1.12)
- Selective Leaching (B.2.1.23)

3.3.2.1.13 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
- Gray Cast Iron
- Stainless Steel
- Stainless Steel Bolting

Environments

The Plant Drainage System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air - Outdoor
- Air/Gas - Wetted
- Concrete
- Soil
- Waste Water

Aging Effects Requiring Management

The following aging effects associated with the Plant Drainage System components require management:

- 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)
- Buried and Underground Piping and Tanks (B.2.1.29)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)
- Selective Leaching (B.2.1.23)

3.3.2.1.14 Primary Containment Instrument Gas System

Materials

The materials of construction for the Primary Containment Instrument Gas System components are:

- Aluminum
- Aluminum Alloy
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Copper
- Copper Alloy with less than 15% Zinc

- Ductile Cast Iron
- Glass
- Gray Cast Iron
- Nickel Alloy
- Stainless Steel
- Stainless Steel Bolting
- Zinc

Environments

The Primary Containment Instrument Gas System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air/Gas - Dry
- Air/Gas - Wetted

Aging Effects Requiring Management

The following aging effects associated with the Primary Containment Instrument Gas 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 Instrument Gas System components:

- Bolting Integrity (B.2.1.11)
- Compressed Air Monitoring (B.2.1.15)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)

3.3.2.1.15 Primary Containment Leak Testing System

Materials

The materials of construction for the Primary Containment Leak Testing System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Copper

- Stainless Steel

Environments

The Primary Containment Leak Testing System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air/Gas - Wetted

Aging Effects Requiring Management

The following aging effects associated with the Primary Containment Leak Testing 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 Leak Testing System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)

3.3.2.1.16 Primary Containment Ventilation System

Materials

The materials of construction for the Primary Containment Ventilation System components are:

- Aluminum
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Copper
- Copper Alloy
- Copper Alloy with 15% Zinc or More
- Elastomer
- Galvanized Steel
- Glass
- Gray Cast Iron
- Stainless Steel

- Stainless Steel Bolting

Environments

The Primary Containment Ventilation System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air/Gas - Wetted
- Closed Cycle Cooling Water
- Waste Water

Aging Effects Requiring Management

The following aging effects associated with the Primary Containment Ventilation 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 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.2.1.25)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)
- Selective Leaching (B.2.1.23)

3.3.2.1.17 Process Radiation Monitoring System

Materials

The materials of construction for the Process Radiation Monitoring System components are:

- Aluminum
- 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
- Air/Gas - Wetted
- Raw Water
- Treated 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)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)
- One-Time Inspection (B.2.1.22)
- Open-Cycle Cooling Water System (B.2.1.12)
- Water Chemistry (B.2.1.2)

3.3.2.1.18 Process and Post-Accident Sampling System

Materials

The materials of construction for the Process and Post-Accident Sampling System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Copper Alloy with less than 15% Zinc
- Elastomer
- Glass
- Stainless Steel

- Stainless Steel Bolting

Environments

The Process and Post-Accident Sampling 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 Process and Post-Accident Sampling System components require management:

- Cracking
- 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 Process and Post-Accident Sampling System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)
- One-Time Inspection (B.2.1.22)
- Water Chemistry (B.2.1.2)

3.3.2.1.19 Radwaste System

Materials

The materials of construction for the Radwaste System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Glass
- Stainless Steel
- Stainless Steel Bolting

Environments

The Radwaste System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air/Gas - Wetted
- Treated Water
- Treated Water > 140° F
- Waste Water
- Waste Water > 140° F

Aging Effects Requiring Management

The following aging effects associated with the Radwaste System components require management:

- Cracking
- Cumulative Fatigue Damage
- 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.2.1.25)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)
- One-Time Inspection (B.2.1.22)
- TLAA
- Water Chemistry (B.2.1.2)

3.3.2.1.20 Reactor Enclosure Ventilation System

Materials

The materials of construction for the Reactor Enclosure Ventilation System components are:

- Aluminum
- Carbon Steel
- Carbon and Low Alloy Steel Bolting

- Copper Alloy with less than 15% Zinc
- Elastomer
- Galvanized Steel
- Glass
- Stainless Steel

Environments

The Reactor Enclosure Ventilation System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air/Gas - Wetted
- Waste Water

Aging Effects Requiring Management

The following aging effects associated with the Reactor Enclosure 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 Reactor Enclosure Ventilation System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)

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
- Cast Austenitic Stainless Steel (CASS)

- Glass
- Stainless Steel
- Stainless Steel Bolting

Environments

The Reactor Water Cleanup System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air/Gas - Wetted
- Lubricating Oil
- Treated Water
- Treated Water > 140° F
- Treated Water > 482° 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 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 Water Cleanup System components:

- BWR Reactor Water Cleanup System (B.2.1.16)
- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Flow-Accelerated Corrosion (B.2.1.10)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)
- Lubricating Oil Analysis (B.2.1.27)
- One-Time Inspection (B.2.1.22)

- TLAA
- Water Chemistry (B.2.1.2)

3.3.2.1.22 Safety Related Service Water System

Materials

The materials of construction for the Safety Related Service Water 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
- Elastomer
- Glass
- Stainless Steel
- Stainless Steel Bolting

Environments

The Safety Related Service Water System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air - Outdoor
- Air/Gas - Wetted
- Raw Water
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Safety Related Service Water 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 Safety Related Service Water System components:

- Bolting Integrity (B.2.1.11)

- Buried and Underground Piping and Tanks (B.2.1.29)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Open-Cycle Cooling Water System (B.2.1.12)

3.3.2.1.23 Spray Pond Pump House Ventilation System

Materials

The materials of construction for the Spray Pond Pump House Ventilation System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Elastomer
- Galvanized Steel

Environments

The Spray Pond Pump House Ventilation System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air/Gas - Wetted

Aging Effects Requiring Management

The following aging effects associated with the Spray Pond Pump House Ventilation System components require management:

- Hardening and Loss of Strength
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Spray Pond Pump House Ventilation System components:

- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)

3.3.2.1.24 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

- Glass
- Stainless Steel
- Stainless Steel Bolting

Environments

The Standby Liquid Control System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air/Gas - Wetted
- Sodium Pentaborate Solution
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Standby Liquid 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 Standby Liquid Control System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)
- One-Time Inspection (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:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Stainless Steel

Environments

The Traversing Incore Probe System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air/Gas - Wetted

Aging Effects Requiring Management

The following aging effects associated with the Traversing Incore Probe System components require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Traversing Incore Probe System components:

- Bolting Integrity (B.2.1.11)
- Compressed Air Monitoring (B.2.1.15)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)

3.3.2.1.26 Water Treatment and Distribution System

Materials

The materials of construction for the Water Treatment and Distribution System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Copper Alloy with less than 15% Zinc
- Stainless Steel

Environments

The Water Treatment and Distribution System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Raw Water
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Water Treatment and Distribution System components require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Water Treatment and Distribution System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- One-Time Inspection (B.2.1.22)
- Open-Cycle Cooling Water System (B.2.1.12)
- Water Chemistry (B.2.1.2)

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 Auxiliary Steam System, Radwaste System, and Reactor Water Cleanup System is discussed in Section 4.3.2. The evaluation of crane load cycles as a TLAA for the Cranes and Hoists system is discussed in Sections 4.6.1 and 4.6.2.

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 LGS.

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.

Item Number 3.3.1-4 is not applicable to LGS. Stress corrosion cracking (SCC) is a mechanism requiring a tensile stress, a corrosive environment, and a susceptible material in order to occur. Outdoor air is assumed to be an aggressive environment having the potential for the concentration of contaminants that could promote SCC. However, SCC of stainless steels exposed to outdoor air is considered plausible only if the material temperature is above 140°F. For the Auxiliary Systems, the outdoor stainless steel components are < 140ºF. Therefore, SSC is not applicable for stainless steel surfaces in an outdoor air environment in Auxiliary Systems at LGS.

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 LGS.

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.

LGS will implement the External Surfaces Monitoring of Mechanical Components (B.2.1.25) program to manage the loss of material in stainless steel piping, piping components, and piping elements exposed to an air-outdoor environment in the Emergency Diesel Generator System and the Safety Related Service Water System. The External Surfaces Monitoring of Mechanical Components program provides for management of aging effects through periodic visual inspection of external surfaces for evidence of loss of material. Visual inspection activities will 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 using the corrective action process to document the concern in accordance with the 10 CFR Part 50, Appendix B Corrective Action Program. The External Surfaces Monitoring of Mechanical Components program is described in Appendix B.

The Buried and Underground Piping and Tanks (B.2.1.29) program has been substituted and will be used to manage the loss of material in stainless steel valve bodies located underground in vaults in the Safety Related Service Water System. The Buried and Underground Piping and Tanks program provides for management of aging effects through periodic volumetric inspections during each 10-year period beginning 10 years prior to the entry into the period of extended operation. Inspection locations will be selected based on susceptibility to degradation and consequences of failure.

Deficiencies will be documented using the corrective action process to document the concern in accordance with the 10 CFR Part 50, Appendix B Corrective Action Program. The Buried and Underground Piping and Tanks 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

3.3.2.3 Time-Limited Aging Analysis

The time-limited aging analyses identified below are associated with the Auxiliary Systems components:

- Section 4.3, Metal Fatigue
    - Section 4.3.2, ASME Section III, Class 2 and 3 and ANSI B31.1 Allowable Stress Calculations
- Section 4.6, Other Plant-Specific Time-Limited Aging Analyses
    - Section 4.6.1, Reactor Enclosure Crane Cyclic Loading Analysis
    - Section 4.6.2, Emergency Diesel Generator Enclosure Cranes Cyclic Loading 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.

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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	PWRs only.				
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	Not applicable. See Subsection 3.3.2.2.3.
3.3.1-5	PWRs 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
3.3.1-6	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.2.1.25) program will be used to manage the loss of material in stainless steel piping, piping components, and piping elements exposed to an air-outdoor environment. The Buried and Underground Piping and Tanks (B.2.1.29) program has been substituted and will be used to manage the loss of material in stainless steel valve bodies located underground in vaults. See Subsection 3.3.2.2.5.
3.3.1-7	PWRs only.				
3.3.1-8	PWRs only.				
3.3.1-9	PWRs 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 high-strength steel closure bolting exposed to air with steam or water leakage in the Auxiliary Systems.
3.3.1-11	PWRs 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
3.3.1-12	Steel; stainless steel Closure bolting, Bolting exposed to Condensation, Air – indoor, uncontrolled (External), Air – outdoor (External)	Loss of material due to general (steel onlyl), 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 the loss of material in carbon and low alloy steel and stainless steel closure bolting exposed to air-indoor, uncontrolled, air-outdoor, and air/gas-wetted environments in the Auxiliary Steam System, Closed Cooling Water System, Compressed Air System, Control Enclosure Ventilation System, Control Rod Drive System, Emergency Diesel Generator System, Fire Protection System, Fuel Pool Cooling and Cleanup System, Nonsafety-Related Service Water System, Plant Drainage System, Primary Containment Instrument Gas System, Primary Containment Leak Testing System, Primary Containment Ventilation System, Process Radiation Monitoring System, Process and Post-Accident Sampling System, Radwaste System, Reactor Enclosure Ventilation System, Reactor Water Cleanup System, Safety Related Service Water System, Standby Liquid Control System, Traversing Incore Probe System, and Water Treatment and Distribution System. The Buried and Underground Piping and Tanks (B.2.1.29) program has been substituted and will be used to manage the loss of material in carbon and low alloy steel closure bolting located underground in vaults in the Emergency Diesel Generator System and Safety Related Service 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
3.3.1-13	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 the Auxiliary Systems.
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 the loss of preload in carbon and low alloy steel bolting exposed to soil 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
3.3.1-15	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 the loss of preload in carbon and low alloy steel and stainless steel closure bolting exposed to air-indoor, uncontrolled, air-outdoor, raw water, and treated water environments in the Auxiliary Steam System, Circulating Water System, Closed Cooling Water System, Compressed Air System, Control Enclosure Ventilation System, Control Rod Drive System, Emergency Diesel Generator System, Fire Protection System, Fuel Pool Cooling and Cleanup System, Nonsafety-Related Service Water System, Plant Drainage System, Primary Containment Instrument Gas System, Primary Containment Leak Testing System, Primary Containment Ventilation System, Process Radiation Monitoring System, Process and Post-Accident Sampling System, Radwaste System, Reactor Enclosure Ventilation System, Reactor Water Cleanup System, Safety Related Service Water System, Standby Liquid Control System, Traversing Incore Probe System, and Water Treatment and Distribution System.
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	Consistent with NUREG-1801. The BWR Reactor Water Cleanup System (B.2.1.16) program and Water Chemistry (B.2.1.2) program will be used to manage cracking in stainless steel piping, piping components, and piping elements exposed to treated water >140°F in the Reactor Water 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
3.3.1-17	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	Not Applicable. There are no stainless steel heat exchanger tubes exposed to treated water with a reduction of heat transfer aging effect in the Auxiliary Systems.
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 >140°F or sodium pentaborate solution >140°F in the Auxiliary Systems. The sodium pentaborate solution in the Standby Liquid Control System is maintained below 140°F.
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. The Water Chemistry (B.2.1.2) program and One-Time Inspection (B.2.1.22) program will be used to manage cracking in stainless steel regenerative heat exchanger components, piping, piping components, and piping elements exposed to treated water >140°F in the Reactor Water Cleanup System, Auxiliary Steam System, and Process and Post-Accident Sampling 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
3.3.1-20	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. The Water Chemistry (B.2.1.2) program and One-Time Inspection (B.2.1.22) program will be used to manage cracking in stainless steel, cast austenitic stainless steel, and carbon or low alloy steel with stainless steel cladding in heat exchanger components, piping, piping components, and piping elements exposed to treated water >140°F in the Radwaste System, Reactor Water Cleanup System, and Reactor Coolant Pressure Boundary System.
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. The Water Chemistry (B.2.1.2) program and One-Time Inspection (B.2.1.22) program will be used to manage the loss of material in carbon steel piping, piping components, and piping elements, tanks, and heat exchanger components exposed to treated water in the Auxiliary Steam System, Control Rod Drive System, Fuel Pool Cooling and Cleanup System, Process Radiation Monitoring System, Process and Post-Accident Sampling System, Radwaste System, Reactor Water Cleanup System, Standby Liquid Control System, and Water Treatment and Distribution 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
3.3.1-22	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. The Water Chemistry (B.2.1.2) program and One-Time Inspection (B.2.1.22) program will be used to manage the loss of material in copper alloy piping, piping components, and piping elements, and heat exchanger components exposed to treated water in the Auxiliary Steam System, Fuel Pool Cooling and Cleanup System, High Pressure Coolant Injection System, Process Radiation Monitoring System, Process and Post-Accident Sampling System, and Reactor Core Isolation Cooling System.
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 a treated water environment 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 a treated water environment 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. The Water Chemistry (B.2.1.2) program and One-Time Inspection (B.2.1.22) program will be used to manage the loss of material in stainless steel, cast austenitic stainless steel, carbon or low alloy steel with stainless steel cladding, and aluminum piping, piping components, and piping elements, heat exchanger components, and tanks exposed to treated water and sodium pentaborate solution in the Auxiliary Steam System, Control Rod Drive System, Fuel Handling and Storage, Fuel Pool Cooling and Cleanup System, Process Radiation Monitoring System, Process and Post-Accident Sampling System, Radwaste System, Reactor Coolant Pressure Boundary, Reactor Water Cleanup System, Standby Liquid Control System, and Water Treatment and Distribution System. The Bolting Integrity (B.2.1.11) program has been substituted and will be used to manage the loss of material in stainless steel bolting exposed to treated water in the Fuel Pool Cooling and Cleanup System. The Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.2.1.14) program has been substituted for the One-Time Inspection (B.2.1.22) program and will be used with the Water Chemistry (B.2.1.2) program to manage the loss of material in aluminum crane/hoist components exposed to treated water in the Fuel Handling and Storage 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
3.3.1-26	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. This item number for the loss of material in lined/clad steel exposed to treated water after elastomer lining or stainless steel cladding degradation was not used. Elastomer lining was not credited for preventing the loss of material aging effect in steel. Stainless steel cladding was not assumed to fail due to degradation.
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	Not Applicable. There are no stainless steel heat exchanger tubes exposed to treated water with the reduction of heat transfer aging effect in the 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
3.3.1-28	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, Piping, piping components, and piping elements; tanks exposed Treated water >60°C (>140°F), Treated borated water >60°C (>140°F)	Cracking due to stress corrosion cracking	Chapter XI.M2, "Water Chemistry"	No	Not Applicable. The stainless steel fuel storage racks are not exposed to treated water >140°F, therefore, cracking does not apply. Cracking in stainless steel, cast austenitic stainless steel, and carbon or low alloy steel with stainless steel cladding in Auxiliary System piping, piping components, and piping elements, heat exchanger components, and tanks exposed treated water >140°F is addressed in Item Numbers 3.3.1-16, 3.3.1-19, and 3.3.1-20.
3.3.1-29	Steel (with stainless steel cladding); stainless steel Piping, piping components, and piping elements exposed to Treated borated water	Loss of material due to pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry"	No	Not applicable. This item number is associated with the treated borated water environment of the Chemical and Volume Control System and Spent Fuel Pool Cooling and Cleanup System in PWRs. In a BWR, this item number applies to Spent Fuel Storage Systems with a treated borated water environment. The LGS fuel storage environment is treated water.

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 is no concrete or cementitious material piping, piping components, and piping elements exposed to raw water with a change in material properties aging effect in the 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 is no fiberglass or HDPE piping, piping components, and piping elements exposed to raw water in the 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 is no concrete or cementitious material piping, piping components, and piping elements exposed to raw water with a cracking aging effect in the 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
3.3.1-32	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 or asbestos cement piping, piping components, and piping elements exposed to raw water with a cracking or change in material properties aging effect in the Auxiliary Systems.
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	Consistent with NUREG-1801. The Open-Cycle Cooling Water System (B.2.1.12) program will be used to manage the hardening and loss of strength and the loss of material in elastomer seals exposed to raw water in the Circulating Water System and Safety Related Service Water System.
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	The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) program has been substituted and will be used to manage the loss of material in concrete or cementitious material piping, piping components, and piping elements exposed to raw water in the Fire Protection System.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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 is no nickel alloy exposed to raw water in the Auxiliary Systems. The loss of material in copper alloy piping, piping components, and piping elements exposed to raw water is addressed in Item Numbers 3.3.1-36 and 3.3.1-38.
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 Item Numbers 3.3.1-36 and 3.3.1-38.
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 the loss of material in copper alloy piping, piping components, and piping elements exposed to raw water in the Nonsafety-Related Service Water System and Process Radiation 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
3.3.1-37	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	Not applicable. The loss of material in carbon steel piping, piping components, and piping elements exposed to raw water is addressed in Item Number 3.3.1-38. Coating/lining has not been credited for mitigating the loss of material for license renewal.
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 the loss of material in copper alloy, carbon steel, ductile cast iron, and gray cast iron piping, piping components, and piping elements, and heat exchanger components exposed to raw water in the Nonsafety-Related Service Water System, Process Radiation Monitoring System, and Safety Related Service 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 Item Number 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 the loss of material in stainless steel piping, piping components, and piping elements exposed to raw water in the Safety Related Service Water 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 Structures Monitoring (B.2.1.35) program has been substituted and will be used to manage the loss of material in stainless steel structural bolting and structural elements exposed to raw water in the Control Enclosure, Radwaste Enclosure, and Reactor Enclosure. The RG 1.127 Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36) program has been substituted and will be used to manage the loss of material in stainless steel structural bolting exposed to raw water in the Spray Pond and Pump 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 the reduction of heat transfer in copper alloy and stainless steel heat exchanger components exposed to raw water in the Safety Related Service 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	Not applicable. There are no stainless steel piping, piping components, and piping elements exposed to closed cycle cooling water >140°F in the Auxiliary Systems.
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	Not applicable. There are no stainless steel or steel with stainless steel cladding heat exchanger components exposed to closed cycle cooling water >140°F in the Auxiliary Systems.
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 the loss of material in carbon steel and gray cast iron piping, piping components, and piping elements, tanks, and heat exchanger components exposed to closed cycle cooling water in the Closed Cooling Water System, Control Enclosure Ventilation System, Emergency Diesel Generator System, and Primary Containment 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
3.3.1-46	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 the loss of material in carbon steel and copper alloy heat exchanger components, piping, piping components, and piping elements exposed to closed cycle cooling water in the Closed Cooling Water System, Control Enclosure Ventilation System, Emergency Diesel Generator System, and Primary Containment Ventilation 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. 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 is no aluminum exposed to closed cycle cooling water in the 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 the loss of material in stainless steel piping, piping components, and piping elements, and heat exchanger components exposed to closed cycle cooling water in the Closed Cooling Water System, Control Enclosure Ventilation System, Emergency Diesel Generator System, Primary Containment Ventilation System, and Reactor Coolant Pressure Boundary.
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 the reduction of heat transfer in carbon steel and copper alloy heat exchanger components exposed to closed cycle cooling water in the Control Enclosure Ventilation System and Emergency Diesel Generator 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. LGS does not use Boraflex for neutron absorption in the spent fuel storage racks. The LGS spent fuel storage racks use Boral for neutron absorption. The reduction in neutron absorbing capacity for Boral 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 the loss of material due to corrosion in carbon steel Crane/Hoist components exposed to air-indoor, uncontrolled in the Cranes and Hoists system and Fuel Handling and Storage 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 the loss of material due to wear in carbon steel Crane/Hoist rail systems exposed to air-indoor, uncontrolled in the Cranes and Hoists system and Fuel Handling and Storage 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 the loss of material in copper alloy piping, piping components, and piping elements exposed to air/gas-wetted in the Compressed Air System and Primary Containment Instrument Gas 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. The Compressed Air Monitoring (B.2.1.15) program will be used to manage the loss of material in carbon steel piping, piping components, and piping elements exposed to air/gas-wetted in the Compressed Air System and Traversing Incore Probe System.
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. The Compressed Air Monitoring (B.2.1.15) program will be used to manage the loss of material in stainless steel piping, piping components, and piping elements exposed to air/gas-wetted in the Compressed Air System, Primary Containment Instrument Gas System, and Traversing Incore Probe System. The Open-Cycle Cooling Water System (B.2.1.12) program has been substituted and will be used to manage the loss of material in stainless steel piping, piping components, and piping elements exposed to air/gas-wetted in the Safety Related Service 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
3.3.1-57	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.2.1.17) program will be used to manage hardening and loss of strength in elastomer fire barrier penetration seals exposed to air-indoor, uncontrolled in the Fire Protection System. The Structures Monitoring (B.2.1.35) program has been substituted and will be used to manage increased hardness, shrinkage, and loss of strength in elastomer expansion joints and seismic gap fillers exposed to air-indoor, uncontrolled and air-outdoor in the Admin Building Shop and Warehouse, Auxiliary Boiler and Lube Oil Storage Enclosure, Control Enclosure, Emergency Diesel Generator Enclosure, Primary Containment, Radwaste Enclosure, Reactor Enclosure, Service Water Pipe Tunnel, Spray Pond and Pump House, Turbine Enclosure, and Yard Facilities.
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.2.1.17) program will be used to manage the loss of material in carbon steel halon/carbon dioxide fire suppression piping, piping components, and piping elements, and tanks exposed to air-indoor, uncontrolled 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
3.3.1-59	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.2.1.17) program will be used to manage the loss of material in carbon steel fire doors exposed to air-indoor, uncontrolled and air-outdoor in the Fire Protection System.
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.2.1.17) program and Structures Monitoring (B.2.1.35) program will be used to manage cracking and spalling in concrete fire barrier curbs, walls, and slabs, and, cracking in grout fire barrier penetration seals 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.2.1.17) program and Structures Monitoring (B.2.1.35) program will be used to manage cracking and spalling in concrete fire barrier 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.2.1.17) program and Structures Monitoring (B.2.1.35) program will be used to manage the loss of material in concrete fire barrier curbs, 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. The Fire Water System (B.2.1.18) program will be used to manage the loss of material in gray cast iron fire hydrants exposed to 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
3.3.1-64	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	Chapter XI.M27, "Fire Water System"	No	Consistent with NUREG-1801. The Fire Water System (B.2.1.18) program will be used to manage the loss of material in carbon steel, copper alloy, ductile cast iron, galvanized steel, and gray cast iron fire hydrants, piping, piping components, and piping elements, and tanks exposed to raw water in the Fire Protection System. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) program has been substituted and will be used to manage the loss of material in carbon steel piping, piping components, and piping elements, and tanks exposed to raw water in the Emergency Diesel Generator System. The RG 1.127 Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36) program has been substituted and will be used to manage the loss of material in carbon steel, ductile cast iron, and galvanized steel concrete embedments and structural bolting exposed to raw water in the Spray Pond and Pump House. The Structures Monitoring (B.2.1.35) program has been substituted and will be used to manage the loss of material in carbon and low alloy steel and galvanized steel structural bolting and structural elements exposed to raw water in the Turbine Enclosure.

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	Chapter XI.M27, "Fire Water System"	No	Consistent with NUREG-1801. The Fire Water System (B.2.1.18) program will be used to manage the loss of material in aluminum piping, piping components, and piping elements exposed to raw water in the Fire Protection 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	Chapter XI.M27, "Fire Water System"	No	Consistent with NUREG-1801. The Fire Water System (B.2.1.18) program will be used to manage the loss of material in stainless steel piping, piping components, and piping elements exposed to raw water in the Fire Protection System.
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	Consistent with NUREG-1801. The Aboveground Metallic Tanks (B.2.1.19) program will be used to manage the loss of material in carbon steel tanks exposed to air-outdoor in the Fire Protection System. The Buried and Underground Piping and Tanks (B.2.1.29) program has been substituted and will be used to manage the loss of material in carbon steel tanks located underground in vaults in the Emergency Diesel Generator System.
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.

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
3.3.1-69	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.2.1.20) program and One-Time Inspection (B.2.1.22) program will be used to manage the loss of material in copper alloy piping, piping components, and piping elements exposed to fuel oil in the Emergency Diesel Generator System and Fire Protection System. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) program has been substituted and will be used to manage the loss of material in the copper alloy valve bodies associated with dirty fuel oil drain piping in the Emergency Diesel Generator 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.2.1.20) program and One-Time Inspection (B.2.1.22) program will be used to manage the loss of material in carbon steel, ductile cast iron, and gray cast iron piping, piping components, and piping elements, and tanks exposed to fuel oil in the Emergency Diesel Generator System and Fire Protection System. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) program has been substituted and will be used to manage the loss of material in the carbon steel Dirty Fuel Oil Drain Tank and dirty fuel oil drain piping in the Emergency Diesel Generator 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.2.1.20) program and One-Time Inspection (B.2.1.22) program will be used to manage the loss of material in stainless steel piping, piping components, and piping elements exposed to fuel oil in the Emergency Diesel Generator System and Fire Protection 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	Loss of material due to selective leaching	Chapter XI.M33, “Selective Leaching”	No	Consistent with NUREG-1801. The Selective Leaching (B.2.1.23) program will be used to manage the loss of material due to selective leaching in copper alloy with 15% zinc or more and gray cast iron piping, piping components, and piping elements, heat exchanger components, fire hydrants, and tanks exposed to closed cycle cooling water, raw water, treated water, and soil in the Auxiliary Steam System, Closed Cooling Water System, Emergency Diesel Generator System, Fire Protection System, High Pressure Coolant Injection System, Nonsafety-Related Service Water System, Plant Drainage System, Primary Containment Ventilation System, and Reactor Core Isolation Cooling System.
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 or cementitious material piping, piping components, and piping elements exposed to air-outdoor in the 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
3.3.1-74	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 or cementitious material piping, piping components, and piping elements exposed to air-outdoor in the 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 or asbestos cement material piping, piping components, and piping elements exposed to air-outdoor in the 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
3.3.1-76	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.2.1.25) program will be used to manage hardening and loss of strength in elastomer seals and components exposed to air-indoor, uncontrolled in the Circulating Water System, Compressed Air System, Control Enclosure Ventilation System, Emergency Diesel Generator Enclosure Ventilation System, Emergency Diesel Generator System, Fuel Pool Cooling and Cleanup System, Primary Containment Ventilation System, Reactor Enclosure Ventilation System, Safety Related Service Water System, and Spray Pond Pump House Ventilation System. The Structures Monitoring (B.2.1.35) program has been substituted and will be used to manage hardening and loss of strength in elastomer seals exposed to air-gas/wetted in the Reactor Enclosure.
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 or cementitious material piping, piping components, and piping elements exposed to air-outdoor in the 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
3.3.1-78	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.2.1.25) program will be used to manage the loss of material in carbon steel or low allow steel, carbon or low allow steel with stainless steel cladding, ductile cast iron, and gray cast iron piping, piping components, and piping elements, bolting, ducting and components, heat exchanger components, and tanks exposed to air-indoor, uncontrolled in the Auxiliary Steam System, Closed Cooling Water System, Compressed Air System, Control Enclosure Ventilation System, Control Rod Drive System, Emergency Diesel Generator Enclosure Ventilation System, Emergency Diesel Generator System, Fire Protection System, Fuel Pool Cooling and Cleanup System, Nonsafety-Related Service Water System, Plant Drainage System, Primary Containment Instrument Gas System, Primary Containment Leak Testing System, Primary Containment Ventilation System, Process Radiation Monitoring System, Process and Post-Accident Sampling System, Radwaste System, Reactor Enclosure Ventilation System, Reactor Water Cleanup System, Safety Related Service Water System, Spray Pond Pump House Ventilation System, Standby Liquid Control System, Traversing Incore Probe System, and Water Treatment and Distribution System. The Fire Protection (B.2.1.17) program has been substituted and will be used to manage the loss of material in carbon steel fire barriers exposed to air-indoor, uncontrolled 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. Copper alloy exposed to an external air-gas/wetted environment is associated with cooling coils in ventilation systems. The external surface of the cooling coils is inspected during the internal inspection of the cooler assembly. This is addressed in Item Number 3.3.1-89.

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.2.1.25) program will be used to manage the loss of material in carbon steel heat exchanger components exposed to air-indoor, uncontrolled and in carbon steel, ductile cast iron, and gray cast iron piping, piping components, and piping elements exposed to air-outdoor in the Circulating Water System, Control Enclosure Ventilation System, Emergency Diesel Generator System, Fire Protection System, Plant Drainage System, Primary Containment Ventilation System, Reactor Enclosure Ventilation System, Residual Heat Removal System, and Safety Related Service Water System. The Buried and Underground Piping and Tanks (B.2.1.29) program has been substituted and will be used to manage the loss of material in carbon steel and gray cast iron piping, piping components, and piping elements located underground in vaults, exposed to an air-outdoor (external) environment, in the Emergency Diesel Generator System, Safety Related Service Water System, and the Plant Drainage System. The Fire Protection (B.2.1.17) program has been substituted and will be used to manage the loss of material in carbon steel fire barriers exposed to 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
3.3.1-81	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	Consistent with NUREG-1801. The External Surfaces Monitoring of Mechanical Components (B.2.1.25) program will be used to manage the loss of material in copper alloy and aluminum piping, piping components, and piping elements exposed to air-outdoor in the Fire Protection System.
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.2.1.25) program will be used to manage the loss of material in elastomer flexible connections exposed to air-indoor, uncontrolled in the Control Enclosure Ventilation System, Emergency Diesel Generator Enclosure Ventilation System, Primary Containment Ventilation System, Reactor Enclosure Ventilation System, Spray Pond Pump House 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.2.1.26) program will be used to manage cracking in stainless steel diesel engine exhaust piping, piping components, and piping elements exposed to diesel exhaust in the Emergency Diesel Generator 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
3.3.1-85	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	Consistent with NUREG-1801. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) program will be used to manage hardening and loss of strength in elastomer components exposed to closed cycle cooling water in the Emergency Diesel Generator System.
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	Consistent with NUREG-1801. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) program will be used to manage hardening and loss of strength in elastomer components exposed to treated water in the Fuel Pool Cooling and Cleanup System and Process and Post-Accident Sampling System. The Structures Monitoring (B.2.1.35) program has been substituted and will be used to manage hardening and loss of strength in elastomer seals exposed to treated water in the Reactor Enclosure.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-88	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.2.1.26) program will be used to manage the loss of material in carbon steel and stainless steel piping, piping components, and piping elements, and tanks exposed to diesel exhaust or raw water in the Emergency Diesel Generator 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	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.2.1.26) program will be used to manage the loss of material in carbon steel, ductile cast iron, gray cast iron, and copper alloy piping, piping components, and piping elements, heat exchanger components, and tanks exposed to air-gas/wetted in the Closed Cooling Water System, Condenser and Air Removal System, Control Enclosure Ventilation System, Control Rod Drive System, Emergency Diesel Generator System, Fire Protection System, Fuel Pool Cooling and Cleanup System, Nonsafety-Related Service Water System, Primary Containment Instrument Gas System, Primary Containment Leak Testing System, Primary Containment Ventilation System, Radwaste System, Reactor Enclosure Ventilation System, Reactor Water Cleanup System, Residual Heat Removal System, and Standby Gas Treatment System. The Open-Cycle Cooling Water System (B.2.1.12) program has been substituted and will be used to manage the loss of material in carbon steel and ductile cast iron piping, piping components, and piping elements exposed to air-gas/wetted in the Safety Related Service 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
3.3.1-90	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.2.1.26) program will be used to manage the loss of material in carbon steel and galvanized steel piping, piping components, and piping elements, ducting components, and heat exchanger components exposed to air-gas/wetted in the Control Enclosure Ventilation System, Emergency Diesel Generator Enclosure Ventilation System, Primary Containment Ventilation System, Reactor Enclosure Ventilation System, and Spray Pond Pump House 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.2.1.26) program will be used to manage the loss of material in carbon steel, ductile cast iron, gray cast iron, and galvanized steel piping, piping components, and piping elements, and tanks exposed to waste water in the Containment Atmospheric Control System, Plant Drainage System, Radwaste System, and Reactor Coolant Pressure Boundary 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.2.1.26) program will be used to manage the loss of material in aluminum piping, piping components, and piping elements, ducting components, and heat exchanger components exposed to air-gas/wetted in the Control Enclosure Ventilation System, Emergency Diesel Generator System, Primary Containment Ventilation System, Process Radiation Monitoring System, Reactor Enclosure Ventilation System, and Standby Gas Treatment System. The Compressed Air Monitoring (B.2.1.15) program has been substituted and will be used to manage the loss of material in aluminum piping, piping components, and piping elements exposed to air-gas/wetted in the Compressed Air System and Primary Containment Instrument Gas 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 the 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.2.1.26) program will be used to manage the loss of material in stainless steel piping, piping components, and piping elements, ducting components, tanks, and heat exchanger components exposed to air-gas/wetted in the Control Enclosure Ventilation System, Emergency Diesel Generator System, Primary Containment Instrument Gas System, Primary Containment Ventilation System, Process Radiation Monitoring System, Radwaste System, and Reactor Enclosure 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.2.1.26) program will be used to manage the loss of material in carbon steel, stainless steel, and nickel alloy piping, piping components, and piping elements, ducting components, and tanks exposed to air-gas/wetted or waste water in the Containment Atmospheric Control System, Control Enclosure Ventilation System, Control Rod Drive System, Emergency Diesel Generator System, Fuel Pool Cooling and Cleanup System, Plant Drainage System, Primary Containment Instrument Gas System, Primary Containment Leak Testing System, Primary Containment Ventilation System, Radwaste System, and Reactor Enclosure Ventilation System.
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 or components exposed to air-indoor, uncontrolled with a loss of material aging effect in the 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
3.3.1-97	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.2.1.27) program and One-Time Inspection (B.2.1.22) program will be used to manage the loss of material in carbon steel and gray cast iron piping, piping components, and piping elements, and tanks exposed to lubricating oil in the Control Enclosure Ventilation System, Emergency Diesel Generator System, Reactor Coolant Pressure Boundary, and Reactor Water Cleanup 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.2.1.27) program and One-Time Inspection (B.2.1.22) program will be used to manage the loss of material in carbon steel heat exchanger components exposed to lubricating oil in the Emergency Diesel Generator System.
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.2.1.27) program and One-Time Inspection (B.2.1.22) program will be used to manage the loss of material in copper alloy piping, piping components, and piping elements, and heat exchanger components exposed to lubricating oil in the Closed Cooling Water System, Control Enclosure Ventilation System, Emergency Diesel Generator System, and Nonsafety-Related Service 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
3.3.1-100	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.2.1.27) program and One-Time Inspection (B.2.1.22) program will be used to manage the loss of material in stainless steel piping, piping components, and piping elements exposed to lubricating oil in the Emergency Diesel Generator System.
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	Not applicable. There are no aluminum heat exchanger components exposed to lubricating oil in the Auxiliary Systems.
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.2.1.28) program will be used to manage the reduction of neutron-absorbing capacity, change in dimensions, and loss of material in Boral spent fuel storage racks exposed to treated water in the Fuel Handling and Storage 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
3.3.1-103	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 is no reinforced concrete or asbestos cement piping, piping components, and piping elements exposed to soil or concrete in the Auxiliary Systems.
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 or fiberglass piping, piping components, and piping elements exposed to soil or concrete in the 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 is no concrete cylinder piping or asbestos cement piping, piping components, and piping elements exposed to soil or concrete in the 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
3.3.1-106	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 and Tanks (B.2.1.29) program will be used to manage the loss of material in carbon steel and gray cast iron piping, piping components, and piping elements, fire hydrants, and tanks exposed to soil in the Emergency Diesel Generator System, Fire Protection System, Plant Drainage System, and Safety Related Service Water System. The Structures Monitoring (B.2.1.35) program has been substituted and will be used to manage the loss of material in carbon steel and galvanized steel penetration sleeves exposed to groundwater/soil in the Diesel Oil Storage Tank Structures. Steel piping, piping components, and piping elements exposed to concrete is addressed in Item Number 3.3.1-112.
3.3.1-107	Stainless steel 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 piping, piping components, and piping elements exposed to soil in the Auxiliary Systems. Stainless steel piping, piping components, and piping elements exposed to concrete is addressed in Item Number 3.3.1-120.

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 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, or copper alloy piping, piping components, and piping elements, and bolting exposed to soil or concrete in the Auxiliary Systems. There are no stainless steel piping, piping components, and piping elements, and bolting exposed to soil in the Auxiliary Systems. Stainless steel piping, piping components, and piping elements exposed to concrete is addressed in Item Number 3.3.1-120.
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 and Tanks (B.2.1.29) program will be used to manage the loss of material in carbon and low alloy steel bolting exposed to soil in the Fire Protection System.
3.3.1-109x	Underground Aluminum, Copper Alloy, Stainless Steel and 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. The loss of material due to general, pitting, and crevice corrosion of underground steel piping, piping components, and piping elements is addressed in Item Number 3.3.1-80.

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.2.1.12) program manages cracking initiation and growth in Reactor Coolant Pressure Boundary (RCPB) piping, welds and components through the implementation of an augmented Inservice Inspection (ISI) program in accordance with ASME Code, Section XI. This program does not apply to Auxiliary Systems. Cracking in stainless steel piping, piping components, and piping elements exposed to treated water >140°F in the Auxiliary Systems is addressed in Item Numbers 3.3.1-16, 3.3.1-19, and 3.3.1-20.
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 and Hoists system and Fuel Handling and Storage system, there is no structural steel exposed to air-indoor in the Auxiliary Systems. The loss of material in structural steel exposed to air-indoor in the Cranes and Hoists system and Fuel Handling and Storage 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	PWRs 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 the 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, piping, piping components, and piping elements exposed to raw water in the Auxiliary Systems.

Table 3.3.2-1
Auxiliary Steam System
Summary of Aging Management Evaluation

Table 3.3.2-1 Auxiliary 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)	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 Components	Leakage Boundary	Copper Alloy with less than 15% Zinc	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-140	3.3.1-22	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-140	3.3.1-22	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.2.1.25)	VII.D.A-80	3.3.1-78	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.2.1.22)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	A
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.E.S-16	3.4.1-5	A
		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)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-140	3.3.1-22	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-140	3.3.1-22	A
					Selective Leaching (B.2.1.23)	VII.E3.AP-32	3.3.1-72	A

Table 3.3.2-1 Auxiliary 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	Leakage Boundary	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.2.1.22)	VII.E3.AP-140	3.3.1-22	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-140	3.3.1-22	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.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A
			Treated Water > 140°F (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VII.E3.AP-120	3.3.1-19	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-120	3.3.1-19	C
				Cumulative Fatigue Damage	TLAA	VII.E3.A-62	3.3.1-2	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A
Tanks	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-106	3.3.1-21	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	C
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	A

Table 3.3.2-1 Auxiliary Steam 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.2.1.22)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	A
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.E.S-16	3.4.1-5	A
		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)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-140	3.3.1-22	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-140	3.3.1-22	A
					Selective Leaching (B.2.1.23)	VII.E3.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.2.1.22)	VII.E3.AP-140	3.3.1-22	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-140	3.3.1-22	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.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A
			Treated Water > 140°F (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VII.E3.AP-120	3.3.1-19	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-120	3.3.1-19	C
				Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A

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 3.3.2-2
Closed Cooling Water System
Summary of Aging Management Evaluation

Table 3.3.2-2 Closed 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
Flexible Connection	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
Heat Exchanger Components ("A" Reactor Water Cleanup Recirculation Pump Motor Cooler Tube Side Components)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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
		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 Components ("B" and "C" Reactor Water Cleanup Recirculation Pump Seal Cooler Shell Side Components)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A

Table 3.3.2-2 Closed 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 Components ("B" and "C" Reactor Water Cleanup Recirculation Pump Seal Cooler Shell Side Components)	Leakage Boundary	Carbon Steel	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 Components (Instrument Gas Compressor Aftercooler Shell Side Components)	Leakage Boundary	Copper Alloy with 15% Zinc or More	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-144	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
					Selective Leaching (B.2.1.23)	VII.C2.AP-43	3.3.1-72	C
Heat Exchanger Components (Process Radiation Monitor Sample Cooler 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 Components (Reactor Enclosure 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.2.1.25)	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	C

Table 3.3.2-2 Closed 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 Components (Reactor Recirculation Pump Seal Cooler 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 Components (Reactor Water Cleanup 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.2.1.25)	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
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	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	C
		Copper	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
		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)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-199	3.3.1-46	A

Table 3.3.2-2 Closed 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	Copper Alloy with 15% Zinc or More	Closed Cycle Cooling Water (Internal)	Loss of Material	Selective Leaching (B.2.1.23)	VII.C2.AP-43	3.3.1-72	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VII.C2.AP-133	3.3.1-99	A
					One-Time Inspection (B.2.1.22)	VII.C2.AP-133	3.3.1-99	A
		Glass	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Air/Gas - Wetted (Internal)	None	None	VII.J.AP-97	3.3.1-117	A
			Closed Cycle Cooling Water (Internal)	None	None	VII.J.AP-166	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 (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.2.1.25)	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
Pump Casing (Reactor Enclosure Cooling Water Pumps)	Leakage Boundary	Gray Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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.2.1.23)	VII.C2.A-50	3.3.1-72	A

Table 3.3.2-2 Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Tanks (Head Tank and Chemical Addition Tank)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	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
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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	C
		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)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-199	3.3.1-46	A
					Selective Leaching (B.2.1.23)	VII.C2.AP-43	3.3.1-72	A
		Gray Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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.2.1.23)	VII.C2.A-50	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
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A

Table 3.3.2-2 Closed 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	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
		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

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
Hoses	Pressure Boundary	Elastomer	Air - Indoor, Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F1.AP-102	3.3.1-76	A
			Air/Gas - Wetted (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			G
Piping, piping components, and piping elements	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.A-26	3.3.1-55	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Wetted (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.AP-81	3.3.1-56	A
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.A-26	3.3.1-55	A
		Copper	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-10	3.2.1-57	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
Piping, piping components, and piping elements	Structural Support	Copper	Air/Gas - Wetted (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.AP-240	3.3.1-54	A
Valve Body	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.A-26	3.3.1-55	A
		Copper Alloy with less than 15% Zinc	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-10	3.2.1-57	A
			Air/Gas - Wetted (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.AP-240	3.3.1-54	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Wetted (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.AP-81	3.3.1-56	A
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.A-26	3.3.1-55	A
		Copper Alloy with less than 15% Zinc	Air - Indoor, Uncontrolled (External)	None	None	V.F.EP-10	3.2.1-57	A
			Air/Gas - Wetted (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.AP-240	3.3.1-54	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Wetted (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.AP-81	3.3.1-56	A

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 Enclosure Ventilation System
Summary of Aging Management Evaluation

Table 3.3.2-4 Control Enclosure Ventilation 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	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-22	3.3.1-120	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F1.AP-99	3.3.1-94	C
Bolting	Mechanical Closure	Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F1.A-105	3.3.1-78	A
					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
Ducting and Components	Leakage Boundary	Stainless Steel	Air/Gas - Wetted (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F1.AP-99	3.3.1-94	A, 2
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-278	3.3.1-95	C
	Pressure Boundary	Aluminum	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-36	3.3.1-113	C

Table 3.3.2-4 Control Enclosure 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	Aluminum	Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	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.2.1.25)	VII.F1.A-10	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F1.A-08	3.3.1-90	A
		Elastomer	Air - Indoor, Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F1.AP-102	3.3.1-76	A
			Air/Gas - Wetted (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			G
		Galvanized Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-13	3.3.1-116	C
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F1.A-08	3.3.1-90	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	C
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F1.AP-99	3.3.1-94	A
Flexible Connection	Pressure Boundary	Elastomer	Air - Indoor, Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F1.AP-102	3.3.1-76	A

Table 3.3.2-4 Control Enclosure 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	Elastomer	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F1.AP-113	3.3.1-82	A
			Air/Gas - Wetted (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			G
				Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			G
Flow Device	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F1.A-08	3.3.1-90	C
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F1.AP-202	3.3.1-45	A
		Glass	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Air/Gas - Wetted (Internal)	None	None	VII.J.AP-97	3.3.1-117	A
			Closed Cycle Cooling Water (Internal)	None	None	VII.J.AP-166	3.3.1-117	A
Heat Exchanger Components (Chiller Compressor Oil Cooler Shell Side)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	C
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VII.F1.AP-127	3.3.1-97	C
					One-Time Inspection (B.2.1.22)	VII.F1.AP-127	3.3.1-97	C

Table 3.3.2-4 Control Enclosure 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 Components (Chiller Condenser Shell Side Components)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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 Components (Chiller Condenser Tube Sheet)	Pressure Boundary	Copper Alloy with less than 15% Zinc	Air/Gas - Dry (External)	None	None	VII.J.AP-9	3.3.1-114	C
Heat Exchanger Components (Chiller Condenser 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
	Pressure Boundary	Copper Alloy with less than 15% Zinc	Air/Gas - Dry (External)	None	None	VII.J.AP-9	3.3.1-114	C
Heat Exchanger Components (Chiller Evaporator Shell Side Components)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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 Components (Chiller Evaporator Tube Sheet)	Pressure Boundary	Carbon Steel	Air/Gas - Dry (External)	None	None	VII.J.AP-6	3.3.1-121	C
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F1.AP-189	3.3.1-46	A
Heat Exchanger Components (Chiller Evaporator Tubes)	Heat Transfer	Copper	Air/Gas - Dry (External)	None	None	VII.J.AP-9	3.3.1-114	C
			Closed Cycle Cooling Water (Internal)	Reduction of Heat Transfer	Closed Treated Water Systems (B.2.1.13)	VII.F1.AP-205	3.3.1-50	A

Table 3.3.2-4 Control Enclosure 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 Components (Chiller Evaporator Tubes)	Pressure Boundary	Copper	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.F1.AP-203	3.3.1-46	A
Heat Exchanger Components (MCR, AER, and Emerg Switchgear/Batt Rm Unit Cooler Air Side Components)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F1.AP-41	3.3.1-80	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F1.A-08	3.3.1-90	C
Heat Exchanger Components (MCR, AER, and Emerg Switchgear/Batt Rm Unit Cooler Tubes)	Heat Transfer	Copper	Air/Gas - Wetted (External)	Reduction of Heat Transfer	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			H, 1
			Closed Cycle Cooling Water (Internal)	Reduction of Heat Transfer	Closed Treated Water Systems (B.2.1.13)	VII.F1.AP-205	3.3.1-50	A
	Pressure Boundary	Copper	Air/Gas - Wetted (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	C
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F1.AP-203	3.3.1-46	A

Table 3.3.2-4 Control Enclosure 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 Components (SGTS Access Area and Room Unit Cooler Air Side Components)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F1.AP-41	3.3.1-80	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F1.A-08	3.3.1-90	C
Heat Exchanger Components (SGTS Access Area and Room Unit Cooler Tubes)	Heat Transfer	Copper	Air/Gas - Wetted (External)	Reduction of Heat Transfer	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			H, 1
			Closed Cycle Cooling Water (Internal)	Reduction of Heat Transfer	Closed Treated Water Systems (B.2.1.13)	VII.F1.AP-205	3.3.1-50	A
	Pressure Boundary	Copper	Air/Gas - Wetted (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	C
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F1.AP-203	3.3.1-46	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.2.1.25)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F1.A-08	3.3.1-90	C
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F1.AP-202	3.3.1-45	A
		Copper	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A

Table 3.3.2-4 Control Enclosure 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	Copper	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F1.AP-199	3.3.1-46	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VII.H2.AP-133	3.3.1-99	A
					One-Time Inspection (B.2.1.22)	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.2.1.25)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-6	3.3.1-121	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F1.AP-202	3.3.1-45	A
		Copper	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
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F1.AP-199	3.3.1-46	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 - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	A

Table 3.3.2-4 Control Enclosure 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 - Wetted (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
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-273	3.3.1-95	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 (Chiller Compressor Crankcase, Oil Pump)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VII.F1.AP-127	3.3.1-97	A
					One-Time Inspection (B.2.1.22)	VII.F1.AP-127	3.3.1-97	A
Pump Casing (Control Encl. Chilled Water Circ. Pumps)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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.F1.AP-202	3.3.1-45	A
Pump Casing (Toxic Gas Analyzer Pumps)	Pressure Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A

Table 3.3.2-4 Control Enclosure Ventilation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Pump Casing (Toxic Gas Analyzer Pumps)	Pressure Boundary	Stainless Steel	Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F1.AP-99	3.3.1-94	C
Tanks (CECW Head Tanks)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-280	3.3.1-95	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F1.AP-202	3.3.1-45	A
Tanks (Chemical Feed Tanks)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-280	3.3.1-95	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F1.AP-202	3.3.1-45	A
Tanks (Economizer)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-6	3.3.1-121	C
Tanks (MCR and AER Rm Humidifier Pan)	Leakage Boundary	Stainless Steel	Air/Gas - Wetted (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F1.AP-99	3.3.1-94	A, 2
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F1.AP-99	3.3.1-94	A

Table 3.3.2-4 Control Enclosure Ventilation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Tanks (MCR and AER Rm Humidifier Pan)	Leakage Boundary	Stainless Steel	Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-278	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
	Pressure Boundary	Aluminum	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-36	3.3.1-113	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-37	3.3.1-113	A
		Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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.F1.AP-202	3.3.1-45	A
		Copper	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	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 - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	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 3.3.2-4 Control Enclosure 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	Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-273	3.3.1-95	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

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 Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) program is used to manage the aging effects applicable to this component type, material, and environment combination.

2. The stainless steel drip pan and humidifier pans are located internal to the ventilation ductwork, and therefore the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) program is used to manage the applicable aging effects.

Table 3.3.2-5
Control Rod Drive System
Summary of Aging Management Evaluation

Table 3.3.2-5 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.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E4.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-273	3.3.1-95	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	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
Flow Device (Flow 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.2.1.22)	VII.E4.AP-110	3.3.1-25	A

Table 3.3.2-5 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
Flow Device (Flow Elements)	Leakage Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	A
Flow Device (Flow Glasses)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	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
			Air/Gas - Wetted (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
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	A
Flow Device (Orifices)	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.2.1.22)	VII.E4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	A
	Throttle	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.2.1.22)	VII.E4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	A

Table 3.3.2-5 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	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E4.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	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.2.1.22)	VII.E4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E4.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	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	IV.C1.R-220	3.1.1-6	C, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	VII.E4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	A

Table 3.3.2-5 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 (Filter/Strainer Housings)	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.2.1.22)	VII.E4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	A
Rupture Disks	Pressure Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-273	3.3.1-95	A
Sensor Element	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	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
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	A
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E4.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	A

Table 3.3.2-5 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	Leakage Boundary	Cast Austenitic Stainless Steel (CASS)	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.2.1.22)	VII.E4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	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.2.1.22)	VII.E4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	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
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	A
Valve Body (Check Valves)	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.2.1.22)	VII.E4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	A
Valve Body (Relief Valves)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A

Table 3.3.2-5 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 (Relief Valves)	Leakage Boundary	Carbon Steel	Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	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
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-110	3.3.1-25	A

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 piping components within the Hydraulic Control Units (HCU) is evaluated in Section 4.3.

Table 3.3.2-6
Cranes and Hoists
Summary of Aging Management Evaluation

Table 3.3.2-6 Cranes and Hoists

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Structural Support	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
Crane/Hoist (Bridge / Trolley / Girders)	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled (External)	Cumulative Fatigue Damage	TLAA	VII.B.A-06	3.3.1-1	A, 2
				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 (Jib crane / Columns / Beams / Plates / Anchorage)	Structural Support	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 (Monorail Beams / Lifting Devices / Plates)	Structural Support	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

Table 3.3.2-6 Cranes and Hoists (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Crane/Hoist (Rail System)	Structural Support	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
					Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.2.1.14)	VII.B.A-05	3.3.1-53	A

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 fatigue of this component is evaluated in Section 4.6.

Table 3.3.2-7

Emergency Diesel Generator Enclosure Ventilation System

Summary of Aging Management Evaluation

Table 3.3.2-7 Emergency Diesel Generator Enclosure 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	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F4.A-105	3.3.1-78	A, 1
Ducting and Components	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F4.A-10	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F4.A-08	3.3.1-90	A
		Elastomer	Air - Indoor, Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F4.AP-102	3.3.1-76	A
			Air/Gas - Wetted (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			G
		Galvanized Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-13	3.3.1-116	C
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F4.A-08	3.3.1-90	A
Flexible Connection	Pressure Boundary	Elastomer	Air - Indoor, Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F4.AP-102	3.3.1-76	A
				Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F4.AP-113	3.3.1-82	A

Table 3.3.2-7 Emergency Diesel Generator Enclosure 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	Elastomer	Air/Gas - Wetted (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			G
				Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			G

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 ductwork closure bolting, which is not subject to significant thermal effects or pressure loads. The loss of material will be managed by the External Surfaces Monitoring of Mechanical Components (B.2.1.25) program.

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

Table 3.3.2-8 Emergency Diesel Generator System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Blower (Combustion air)	Pressure Boundary	Aluminum	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-135	3.3.1-113	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F4.AP-142	3.3.1-92	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
			Air - Outdoor (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.I.AP-126	3.3.1-12	A
					Buried and Underground Piping and Tanks (B.2.1.29)	VII.I.AP-126	3.3.1-12	E, 1
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-263	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	Pressure Boundary	Gray Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.H2.A-23	3.3.1-89	A

Table 3.3.2-8 Emergency Diesel Generator System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Compressor	Structural Support	Gray Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.H2.A-23	3.3.1-89	A
Electric Heaters (Housing)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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.H2.AP-202	3.3.1-45	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VII.H2.AP-127	3.3.1-97	A
					One-Time Inspection (B.2.1.22)	VII.H2.AP-127	3.3.1-97	A
Expansion Joints	Pressure Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F2.AP-99	3.3.1-94	A
			Diesel Exhaust (Internal)	Cracking	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.H2.AP-128	3.3.1-83	A
				Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.H2.AP-104	3.3.1-88	A
Flexible Connection	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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.H2.AP-202	3.3.1-45	A

Table 3.3.2-8 Emergency Diesel Generator 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	Carbon Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VII.H2.AP-127	3.3.1-97	A
					One-Time Inspection (B.2.1.22)	VII.H2.AP-127	3.3.1-97	A
Flow Device	Throttle	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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.H2.AP-202	3.3.1-45	A
Heat Exchanger Components (Air Cooler Coolant - Shell Side Components)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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 Components (Air Cooler Coolant - Tubes)	Heat Transfer	Copper Alloy with less than 15% Zinc	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 less than 15% Zinc	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
Heat Exchanger Components (Air Cooler Coolant - Tubesheet)	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.2.1.23)	VII.H2.AP-43	3.3.1-72	C
Heat Exchanger Components (Air Cooler)	Heat Transfer	Aluminum	Air/Gas - Wetted (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F4.AP-142	3.3.1-92	A

Table 3.3.2-8 Emergency Diesel Generator System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger Components (Air Cooler)	Heat Transfer	Aluminum	Air/Gas - Wetted (External)	Reduction of Heat Transfer	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			H, 2
		Copper Alloy with less than 15% Zinc	Air/Gas - Wetted (External)	Reduction of Heat Transfer	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			H, 2
			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
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.H2.AP-41	3.3.1-80	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.H2.A-23	3.3.1-89	C
		Copper Alloy with less than 15% Zinc	Air/Gas - Wetted (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	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
Heat Exchanger Components (Jacket Coolant - Shell Side Components)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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 Components (Jacket Coolant - Tubes)	Heat Transfer	Copper Alloy with less than 15% Zinc	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

Table 3.3.2-8 Emergency Diesel Generator System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger Components (Jacket Coolant - Tubes)	Pressure Boundary	Copper Alloy with less than 15% Zinc	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
Heat Exchanger Components (Jacket Coolant - Tubesheet)	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.2.1.23)	VII.H2.AP-43	3.3.1-72	C
Heat Exchanger Components (Lube Oil Cooler - Shell Side Components)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.H2.AP-41	3.3.1-80	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VII.H2.AP-131	3.3.1-98	A
					One-Time Inspection (B.2.1.22)	VII.H2.AP-131	3.3.1-98	A
Heat Exchanger Components (Lube Oil Cooler - Tubes)	Heat Transfer	Copper Alloy with less than 15% Zinc	Lubricating Oil (External)	Reduction of Heat Transfer	Lubricating Oil Analysis (B.2.1.27)	V.D2.EP-78	3.2.1-51	A
					One-Time Inspection (B.2.1.22)	V.D2.EP-78	3.2.1-51	A
	Pressure Boundary	Copper Alloy with less than 15% Zinc	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VII.H2.AP-133	3.3.1-99	C
					One-Time Inspection (B.2.1.22)	VII.H2.AP-133	3.3.1-99	C
Heat Exchanger Components (Lube Oil Cooler - Tubesheet)	Pressure Boundary	Copper Alloy with 15% Zinc or More	Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VII.H2.AP-133	3.3.1-99	C
					One-Time Inspection (B.2.1.22)	VII.H2.AP-133	3.3.1-99	C

Table 3.3.2-8 Emergency Diesel Generator System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Hoses	Pressure Boundary	Elastomer	Air - Indoor, Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F4.AP-102	3.3.1-76	A
			Air/Gas - Wetted (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			G, 2
			Closed Cycle Cooling Water (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.C2.AP-259	3.3.1-85	A
			Lubricating Oil (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			G, 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.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air - Outdoor (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	VII.H1.A-24	3.3.1-80	E, 1
					External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.H1.A-24	3.3.1-80	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.H2.A-23	3.3.1-89	A
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.20)	VII.H1.AP-105	3.3.1-70	A
					Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.H1.AP-105	3.3.1-70	E, 3

Table 3.3.2-8 Emergency Diesel Generator 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	Fuel Oil (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.H1.AP-105	3.3.1-70	A
			Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-33	3.3.1-64	E, 5
		Glass	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Air/Gas - Wetted (Internal)	None	None	VII.J.AP-97	3.3.1-117	A
			Fuel Oil (Internal)	None	None	VII.J.AP-49	3.3.1-117	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air - Outdoor (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	VII.H1.A-24	3.3.1-80	E, 1
					External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.H1.A-24	3.3.1-80	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.H2.A-23	3.3.1-89	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.H2.AP-202	3.3.1-45	A
			Diesel Exhaust (Internal)	Cumulative Fatigue Damage	TLAA			H, 4
				Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.H2.AP-104	3.3.1-88	A

Table 3.3.2-8 Emergency Diesel Generator 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	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.20)	VII.H1.AP-105	3.3.1-70	A
					One-Time Inspection (B.2.1.22)	VII.H1.AP-105	3.3.1-70	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VII.H2.AP-127	3.3.1-97	A
					One-Time Inspection (B.2.1.22)	VII.H2.AP-127	3.3.1-97	A
			Soil (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	VII.H1.AP-198	3.3.1-106	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 - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.H2.AP-199	3.3.1-46	A
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.20)	VII.H1.AP-132	3.3.1-69	A
					One-Time Inspection (B.2.1.22)	VII.H1.AP-132	3.3.1-69	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VII.H2.AP-133	3.3.1-99	A
					One-Time Inspection (B.2.1.22)	VII.H2.AP-133	3.3.1-99	A
		Ductile Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.20)	VII.H1.AP-105	3.3.1-70	A

Table 3.3.2-8 Emergency Diesel Generator 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	Ductile Cast Iron	Fuel Oil (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	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
			Air/Gas - Wetted (Internal)	None	None	VII.J.AP-97	3.3.1-117	A
			Closed Cycle Cooling Water (Internal)	None	None	VII.J.AP-166	3.3.1-117	A
			Lubricating Oil (Internal)	None	None	VII.J.AP-15	3.3.1-117	A
			Raw Water (Internal)	None	None	VII.J.AP-50	3.3.1-117	A
		Gray Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VII.H2.AP-127	3.3.1-97	A
					One-Time Inspection (B.2.1.22)	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
			Air - Outdoor (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.H2.AP-221	3.3.1-6	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-273	3.3.1-95	A
			Diesel Exhaust (Internal)	Cracking	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.H2.AP-128	3.3.1-83	A

Table 3.3.2-8 Emergency Diesel Generator 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	Diesel Exhaust (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.H2.AP-104	3.3.1-88	A
	Structural Support	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-273	3.3.1-95	A
Pump Casing (Coolant)	Pressure Boundary	Gray Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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.H2.AP-202	3.3.1-45	A
					Selective Leaching (B.2.1.23)	VII.C2.A-50	3.3.1-72	A
Pump Casing (Fuel Oil)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air - Outdoor (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	VII.H1.A-24	3.3.1-80	E, 1
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.20)	VII.H1.AP-105	3.3.1-70	A
					One-Time Inspection (B.2.1.22)	VII.H1.AP-105	3.3.1-70	A
		Gray Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.20)	VII.H1.AP-105	3.3.1-70	A
					One-Time Inspection (B.2.1.22)	VII.H1.AP-105	3.3.1-70	A

Table 3.3.2-8 Emergency Diesel Generator System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Pump Casing (Lube oil)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VII.H2.AP-127	3.3.1-97	A
					One-Time Inspection (B.2.1.22)	VII.H2.AP-127	3.3.1-97	A
		Gray Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VII.H2.AP-127	3.3.1-97	A
					One-Time Inspection (B.2.1.22)	VII.H2.AP-127	3.3.1-97	A
Strainer (Element)	Filter	Stainless Steel	Fuel Oil (External)	Loss of Material	Fuel Oil Chemistry (B.2.1.20)	VII.H1.AP-136	3.3.1-71	A
					One-Time Inspection (B.2.1.22)	VII.H1.AP-136	3.3.1-71	A
			Lubricating Oil (External)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VII.H2.AP-138	3.3.1-100	A
					One-Time Inspection (B.2.1.22)	VII.H2.AP-138	3.3.1-100	A
Tanks	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.H2.A-23	3.3.1-89	C
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.H2.AP-202	3.3.1-45	A
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.20)	VII.H1.AP-105	3.3.1-70	A

Table 3.3.2-8 Emergency Diesel Generator System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Tanks	Pressure Boundary	Carbon Steel	Fuel Oil (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.H1.AP-105	3.3.1-70	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VII.H2.AP-127	3.3.1-97	C
					One-Time Inspection (B.2.1.22)	VII.H2.AP-127	3.3.1-97	C
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	C
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-273	3.3.1-95	A
Tanks (Dirty Fuel Oil Drain Tank)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.H2.A-23	3.3.1-89	C
			Fuel Oil (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.H1.AP-105	3.3.1-70	E, 3
Tanks (Exhaust Silencer Drain Pot)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.H2.A-23	3.3.1-89	C
			Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-33	3.3.1-64	E, 5

Table 3.3.2-8 Emergency Diesel Generator 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 Tanks)	Pressure Boundary	Carbon Steel	Air - Outdoor (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	VII.H1.A-95	3.3.1-67	E, 1
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.H2.A-23	3.3.1-89	C
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.20)	VII.H1.AP-105	3.3.1-70	A
					One-Time Inspection (B.2.1.22)	VII.H1.AP-105	3.3.1-70	A
			Soil (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	VII.H1.AP-198	3.3.1-106	C
Turbocharger Casing	Heat Transfer	Carbon Steel	Closed Cycle Cooling Water (Internal)	Reduction of Heat Transfer	Closed Treated Water Systems (B.2.1.13)	VII.F4.AP-204	3.3.1-50	C
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.H2.A-23	3.3.1-89	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.H2.AP-202	3.3.1-45	A
			Diesel Exhaust (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.H2.AP-104	3.3.1-88	A
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air - Outdoor (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	VII.H1.A-24	3.3.1-80	E, 1

Table 3.3.2-8 Emergency Diesel Generator 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	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.20)	VII.H1.AP-105	3.3.1-70	A
					One-Time Inspection (B.2.1.22)	VII.H1.AP-105	3.3.1-70	A
			Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-33	3.3.1-64	E, 5
		Copper Alloy with 15% Zinc or More	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	A
			Fuel Oil (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.H1.AP-132	3.3.1-69	E, 3
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air - Outdoor (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	VII.H1.A-24	3.3.1-80	E, 1
					External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.H1.A-24	3.3.1-80	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.H2.A-23	3.3.1-89	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.H2.AP-202	3.3.1-45	A

Table 3.3.2-8 Emergency Diesel Generator 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	Diesel Exhaust (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.H2.AP-104	3.3.1-88	A
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.20)	VII.H1.AP-105	3.3.1-70	A
					One-Time Inspection (B.2.1.22)	VII.H1.AP-105	3.3.1-70	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VII.H2.AP-127	3.3.1-97	A
					One-Time Inspection (B.2.1.22)	VII.H2.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
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.H2.AP-199	3.3.1-46	A
					Selective Leaching (B.2.1.23)	VII.H2.AP-43	3.3.1-72	A
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.20)	VII.H1.AP-132	3.3.1-69	A
					One-Time Inspection (B.2.1.22)	VII.H1.AP-132	3.3.1-69	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VII.H2.AP-133	3.3.1-99	A
					One-Time Inspection (B.2.1.22)	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 3.3.2-8 Emergency Diesel Generator 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/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-273	3.3.1-95	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
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.20)	VII.H1.AP-136	3.3.1-71	A
					One-Time Inspection (B.2.1.22)	VII.H1.AP-136	3.3.1-71	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VII.H2.AP-138	3.3.1-100	A
					One-Time Inspection (B.2.1.22)	VII.H2.AP-138	3.3.1-100	A

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 located underground in the Diesel Oil Storage Tank Structures in an Air-Outdoor environment. The Buried and Underground Piping and Tanks (B.2.1.29) program is substituted to manage the aging effect(s) applicable to this component type, material and environment combination.

2. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) program is used to manage the aging effect(s) applicable to this component type, material and environment combination.

3. These components are associated with fuel oil drain piping. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) program is substituted to manage the aging effect(s) applicable to this component type, material and environment combination.

4. 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.

5. These components are associated with the engine exhaust silencer drain piping. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) program is substituted to manage the aging effect(s) applicable to this component type, material and environment combination.

Table 3.3.2-9
Fire Protection System
Summary of Aging Management Evaluation

Table 3.3.2-9 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
			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
			Soil (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	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
Concrete Curbs	Fire Barrier	Concrete	Air - Indoor, Uncontrolled (External)	Concrete cracking and spalling	Fire Protection (B.2.1.17)	VII.G.A-90	3.3.1-60	A
					Structures Monitoring (B.2.1.35)	VII.G.A-90	3.3.1-60	A
				Loss of Material	Fire Protection (B.2.1.17)	VII.G.A-91	3.3.1-62	A
					Structures Monitoring (B.2.1.35)	VII.G.A-91	3.3.1-62	A
Dikes	Direct Flow	Soil (Asphalt covered)	Air - Outdoor (External)	Loss of Material or Loss of Form	Structures Monitoring (B.2.1.35)			F, 1
Fire Barriers (Doors)	Fire Barrier	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	Fire Protection (B.2.1.17)	VII.I.A-77	3.3.1-78	E, 2
						VII.G.A-21	3.3.1-59	A
			Air - Outdoor (External)	Loss of Material	Fire Protection (B.2.1.17)	VII.H1.A-24	3.3.1-80	E, 2
						VII.G.A-22	3.3.1-59	A
Fire Barriers (Fire Rated Enclosures)	Fire Barrier	Darmatt	Air - Indoor, Uncontrolled (External)	Cracking	Fire Protection (B.2.1.17)			F, 3

Table 3.3.2-9 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 (Fire Rated Enclosures)	Fire Barrier	Darmatt	Air - Indoor, Uncontrolled (External)	Loss of Material	Fire Protection (B.2.1.17)			F, 3
		Thermolag	Air - Indoor, Uncontrolled (External)	Cracking	Fire Protection (B.2.1.17)			F, 3
				Loss of Material	Fire Protection (B.2.1.17)			F, 3
Fire Barriers (For steel components)	Fire Barrier	Cafecote	Air - Indoor, Uncontrolled (External)	Cracking	Fire Protection (B.2.1.17)			F, 3
				Loss of Material	Fire Protection (B.2.1.17)			F, 3
Fire Barriers (Penetration Seals)	Fire Barrier	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	Fire Protection (B.2.1.17)	VII.I.A-77	3.3.1-78	E, 2
		Elastomer	Air - Indoor, Uncontrolled (External)	Hardening and Loss of Strength	Fire Protection (B.2.1.17)	VII.G.A-19	3.3.1-57	A
		Grout	Air - Indoor, Uncontrolled (External)	Cracking and spalling	Fire Protection (B.2.1.17)	VII.G.A-90	3.3.1-60	A, 4
					Structures Monitoring (B.2.1.35)	VII.G.A-90	3.3.1-60	A, 4
Fire Barriers (Walls and Slabs)	Fire Barrier	Concrete	Air - Indoor, Uncontrolled (External)	Concrete cracking and spalling	Fire Protection (B.2.1.17)	VII.G.A-90	3.3.1-60	A
					Structures Monitoring (B.2.1.35)	VII.G.A-90	3.3.1-60	A
				Loss of Material	Fire Protection (B.2.1.17)	VII.G.A-91	3.3.1-62	A
					Structures Monitoring (B.2.1.35)	VII.G.A-91	3.3.1-62	A
			Air - Outdoor (External)	Concrete cracking and spalling	Fire Protection (B.2.1.17)	VII.G.A-92	3.3.1-61	A
					Structures Monitoring (B.2.1.35)	VII.G.A-92	3.3.1-61	A
				Loss of Material	Fire Protection (B.2.1.17)	VII.G.A-93	3.3.1-62	A
					Structures Monitoring (B.2.1.35)	VII.G.A-93	3.3.1-62	A
Fire Hydrant	Pressure Boundary	Gray Cast Iron	Air - Outdoor (External)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.AP-149	3.3.1-63	A

Table 3.3.2-9 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 Hydrant	Pressure Boundary	Gray Cast Iron	Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.A-33	3.3.1-64	A
					Selective Leaching (B.2.1.23)	VII.G.A-51	3.3.1-72	A
			Soil (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	VII.G.AP-198	3.3.1-106	A
					Selective Leaching (B.2.1.23)	VII.G.A-02	3.3.1-72	A
Flexible Connection	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Diesel Exhaust (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.H2.AP-104	3.3.1-88	A
Flow Device	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.A-33	3.3.1-64	A
		Glass	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Raw Water (Internal)	None	None	VII.J.AP-50	3.3.1-117	A
Hoses	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
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.20)	VII.G.AP-136	3.3.1-71	A
					One-Time Inspection (B.2.1.22)	VII.G.AP-136	3.3.1-71	A

Table 3.3.2-9 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	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.A-33	3.3.1-64	A
	Pressure Boundary	Aluminum	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-36	3.3.1-113	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.AP-180	3.3.1-65	A
		Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
					Fire Protection (B.2.1.17)	VII.G.AP-150	3.3.1-58	A
			Air - Outdoor (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.H1.A-24	3.3.1-80	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-6	3.3.1-121	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	A
			Diesel Exhaust (Internal)	Cumulative Fatigue Damage	TLAA			H, 7
				Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.H2.AP-104	3.3.1-88	A
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.20)	VII.H1.AP-105	3.3.1-70	A
					One-Time Inspection (B.2.1.22)	VII.H1.AP-105	3.3.1-70	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.A-33	3.3.1-64	A

Table 3.3.2-9 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	Cement	Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.C1.AP-249	3.3.1-33	E, 5
		Copper Alloy with less than 15% Zinc	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.20)	VII.G.AP-132	3.3.1-69	A
					One-Time Inspection (B.2.1.22)	VII.G.AP-132	3.3.1-69	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.AP-197	3.3.1-64	A
		Ductile Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.A-33	3.3.1-64	A
		Galvanized Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-13	3.3.1-116	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.A-33	3.3.1-64	A
		Gray Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.A-33	3.3.1-64	A
					Selective Leaching (B.2.1.23)	VII.G.A-51	3.3.1-72	A
			Soil (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	VII.G.AP-198	3.3.1-106	A
					Selective Leaching (B.2.1.23)	VII.G.A-02	3.3.1-72	A

Table 3.3.2-9 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	Polymer	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-268	3.3.1-119	A
			Raw Water (Internal)	None	None	VII.J.AP-269	3.3.1-119	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
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VIII.B2.SP-110	3.4.1-39	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.A-55	3.3.1-66	A
Pump Casing (Diesel Driven Fire Pump, Motor Driven Fire Pump, Diesel Driven Backup Pump, Electric Backup Jockey Pump, Backup Jockey Pump, Well Pump)	Pressure Boundary	Gray Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.A-33	3.3.1-64	A
					Selective Leaching (B.2.1.23)	VII.G.A-51	3.3.1-72	A
Spray Nozzles	Spray	Aluminum	Air - Outdoor (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.AP-256	3.3.1-81	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.AP-180	3.3.1-65	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 Fire Protection 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	Copper Alloy with 15% Zinc or More	Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	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 - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VIII.B2.SP-110	3.4.1-39	A
Sprinkler Heads	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 - Outdoor (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.AP-159	3.3.1-81	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.AP-197	3.3.1-64	A
	Spray	Copper Alloy with less than 15% Zinc	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Air - Outdoor (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.AP-159	3.3.1-81	A

Table 3.3.2-9 Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Sprinkler Heads	Spray	Copper Alloy with less than 15% Zinc	Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.AP-197	3.3.1-64	A
Strainer (Element)	Filter	Stainless Steel	Raw Water (External)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.A-55	3.3.1-66	A
Tanks (00-T519 Foam Solution Tank)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	C
			Raw Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-270	3.3.1-88	A, 6
Tanks (00-T530 Diesel Oil Day Tank)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	C
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.20)	VII.H1.AP-105	3.3.1-70	A
					One-Time Inspection (B.2.1.22)	VII.H1.AP-105	3.3.1-70	A
Tanks (10-T402 Backup Fire Water Storage Tank)	Pressure Boundary	Carbon Steel	Air - Outdoor (External)	Loss of Material	Aboveground Metallic Tanks (B.2.1.19)	VII.H1.A-95	3.3.1-67	A

Table 3.3.2-9 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 (10-T402 Backup Fire Water Storage Tank)	Pressure Boundary	Carbon Steel	Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	C
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.A-33	3.3.1-64	A
			Soil (External)	Loss of Material	Aboveground Metallic Tanks (B.2.1.19)	VIII.E.SP-115	3.4.1-30	A
Tanks (10-T404 Backup Fuel Oil Tank)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	C
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.20)	VII.H1.AP-105	3.3.1-70	A
					One-Time Inspection (B.2.1.22)	VII.H1.AP-105	3.3.1-70	A
Tanks (CO2)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	Fire Protection (B.2.1.17)	VII.G.AP-150	3.3.1-58	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-6	3.3.1-121	A
Tanks (Halon Cylinders)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	Fire Protection (B.2.1.17)	VII.G.AP-150	3.3.1-58	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-6	3.3.1-121	A
Tanks (Retard Chambers)	Pressure Boundary	Gray Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.A-33	3.3.1-64	A
					Selective Leaching (B.2.1.23)	VII.G.A-51	3.3.1-72	A

Table 3.3.2-9 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	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
					Fire Protection (B.2.1.17)	VII.G.AP-150	3.3.1-58	A
			Air - Outdoor (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.H1.A-24	3.3.1-80	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-6	3.3.1-121	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	A
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.20)	VII.H1.AP-105	3.3.1-70	A
					One-Time Inspection (B.2.1.22)	VII.H1.AP-105	3.3.1-70	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.A-33	3.3.1-64	A
			Soil (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	VII.G.AP-198	3.3.1-106	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-8	3.3.1-114	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.AP-197	3.3.1-64	A
					Selective Leaching (B.2.1.23)	VII.G.A-47	3.3.1-72	A

Table 3.3.2-9 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	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
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.AP-197	3.3.1-64	A
		Ductile Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.A-33	3.3.1-64	A
		Gray Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air - Outdoor (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.H1.A-24	3.3.1-80	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.A-33	3.3.1-64	A
					Selective Leaching (B.2.1.23)	VII.G.A-51	3.3.1-72	A
			Soil (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	VII.G.AP-198	3.3.1-106	A
					Selective Leaching (B.2.1.23)	VII.G.A-02	3.3.1-72	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 3.3.2-9 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	Stainless Steel	Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VIII.B2.SP-110	3.4.1-39	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.A-55	3.3.1-66	A
Water Motor Alarm	Pressure Boundary	Aluminum	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-36	3.3.1-113	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.AP-180	3.3.1-65	A

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 a soil dike covered with asphalt, intended to contain oil spills. The aging effects are similar to those of GALL item III.A6.T-22 for Earthen water-control structures. The Structures Monitoring (B.2.1.35) program is credited with managing the aging effects for this component.

2. The Fire Protection (B.2.1.17) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination.

3. Darmatt, Thermolag, and Cafecote are fire-resistant insulation and coating materials potentially subject to cracking and loss of material. The Fire Protection (B.2.1.17) program manages the aging of these materials.

4. NUREG-1801 does not contain grout fire barriers, however cracking and spalling are applicable aging effects for both grout and concrete materials, and are managed for grout fire barriers by the Fire Protection (B.2.1.17) and Structures Monitoring (B.2.1.35) programs.

5. Cement lined piping is used for the buried fire loop main. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination.

6. The Foam Solution Tank contents is a commercial chemical foam-generating solution that is mixed with water for use. Since it is not controlled by the Water Chemistry (B.2.1.2) program, it has been classified as a Raw Water environment.

7. This component is associated with carbon steel diesel driven Fire Water Pump 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.

Table 3.3.2-10
Fuel Handling and Storage
Summary of Aging Management Evaluation

Table 3.3.2-10 Fuel Handling and Storage

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting	Structural Support	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	A
				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
CRB and Defective Fuel Racks (In Spent fuel Pool)	Structural Support	Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.A4.AP-110	3.3.1-25	C

Table 3.3.2-10 Fuel Handling and Storage (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
CRB and Defective Fuel Racks (In Spent fuel Pool)	Structural Support	Stainless Steel	Treated Water (External)	Loss of Material	Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	C
Crane/Hoist (FFAP and Hoists)	Structural Support	Aluminum Alloy	Air - Indoor, Uncontrolled (External)	None	None	III.B5.TP-8	3.5.1-95	A
		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 Support	Aluminum Alloy	Air - Indoor, Uncontrolled (External)	None	None	III.B5.TP-8	3.5.1-95	A
			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	C
Crane/Hoist (RCWP)	Structural Support	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-123	3.3.1-120	C
Crane/Hoist (Rail System)	Structural Support	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

Table 3.3.2-10 Fuel Handling and Storage (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Crane/Hoist (Refueling Mast/Grapples)	Structural Support	Aluminum Alloy	Air - Indoor, Uncontrolled (External)	None	None	III.B5.TP-8	3.5.1-95	A
		Nickel Alloy	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-16	3.3.1-118	C
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-123	3.3.1-120	C
Crane/Hoist (Refueling Platform and Hoists)	Structural Support	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
Equipment Storage Racks (In Spent Fuel Pool)	Structural Support	Aluminum Alloy	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.A4.AP-130	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.A4.AP-130	3.3.1-25	C
Fuel Storage Racks	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.2.1.28)	VII.A2.AP-236	3.3.1-102	A
	Structural Support	Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.A4.AP-110	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	C
In-Vessel Storage Racks	Structural Support	Aluminum Alloy	Air - Indoor, Uncontrolled (External)	None	None	III.B5.TP-8	3.5.1-95	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-123	3.3.1-120	C
Special Defective Fuel Storage Container	Structural Support	Aluminum Alloy	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.A4.AP-130	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.A4.AP-130	3.3.1-25	C
		Stainless Steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.A4.AP-110	3.3.1-25	C

Table 3.3.2-10 Fuel Handling and Storage (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Special Defective Fuel Storage Container	Structural Support	Stainless Steel	Treated Water (External)	Loss of Material	Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	C

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 Refueling) Handling Systems (B.2.1.14) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.3.2-11
Fuel Pool Cooling and Cleanup System
Summary of Aging Management Evaluation

Table 3.3.2-11 Fuel Pool Cooling and 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
		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
			Treated Water (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.A4.AP-110	3.3.1-25	E, 1
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-267	3.3.1-15	A
Expansion Joints	Pressure Boundary	Nickel Alloy	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-16	3.3.1-118	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-274	3.3.1-95	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)			G, 2
					Water Chemistry (B.2.1.2)			G, 2
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-273	3.3.1-95	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.A4.AP-110	3.3.1-25	A

Table 3.3.2-11 Fuel Pool Cooling and Cleanup 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	Treated Water (Internal)	Loss of Material	Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	A
Flow Device	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	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
			Air/Gas - Wetted (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
Heat Exchanger Components (Fuel Pool Cooling Heat Exchanger - Shell Side Components)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E4.AP-106	3.3.1-21	C
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	C
Hoses	Leakage Boundary	Elastomer	Air - Indoor, Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F3.AP-102	3.3.1-76	A
			Treated Water (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.A4.AP-101	3.3.1-86	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.2.1.25)	VII.I.A-77	3.3.1-78	A

Table 3.3.2-11 Fuel Pool Cooling and 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	Carbon Steel	Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E4.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	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.2.1.22)	VII.A4.AP-140	3.3.1-22	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-140	3.3.1-22	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-273	3.3.1-95	A
			Concrete (Embedded)	None	None	VII.J.AP-19	3.3.1-120	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.A4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E4.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	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.2.1.22)	VII.A4.AP-110	3.3.1-25	A

Table 3.3.2-11 Fuel Pool Cooling and 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	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	A
Pump Casing (Fuel Pool Cooling Pumps)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E4.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	A
Pump Casing (HP Decon PP)	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.2.1.22)	VII.A4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	A
Strainer (Grates and Screens)	Filter	Galvanized Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-13	3.3.1-116	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Treated Water (External)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.A4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	A
Tanks (Skimmer Surge Tanks)	Pressure Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-273	3.3.1-95	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.A4.AP-110	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	C
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A

Table 3.3.2-11 Fuel Pool Cooling and 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.2.1.22)	VII.E4.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	A
		Cast Austenitic Stainless Steel (CASS)	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.2.1.22)	VII.A4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	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.2.1.22)	VII.A4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E4.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E4.AP-106	3.3.1-21	A
		Cast Austenitic Stainless Steel (CASS)	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.2.1.22)	VII.A4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	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.2.1.22)	VII.A4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	A

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(s) applicable to this component type, material, and environment combination.

2. The Water Chemistry (B.2.1.2) and One-Time Inspection (B.2.1.22) programs are used to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.3.2-12
Nonsafety-Related Service Water System
Summary of Aging Management Evaluation

Table 3.3.2-12 Nonsafety-Related Service 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
Flow Device	Leakage Boundary	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.2.1.27)	VII.C1.AP-133	3.3.1-99	A
					One-Time Inspection (B.2.1.22)	VII.C1.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
Heat Exchanger Components (Condenser Compartment Unit Cooler tube side components)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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 3.3.2-12 Nonsafety-Related Service 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 Components (Condenser Compartment Unit Cooler tube side components)	Leakage Boundary	Copper	Air/Gas - Wetted (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	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
		Copper Alloy with 15% Zinc or More	Air/Gas - Wetted (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	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.2.1.23)	VII.C1.A-66	3.3.1-72	A
Heat Exchanger Components (Recombiner Aftercondenser, Fuel Pool Heat Exchanger, and Reactor Enclosure Cooling Water Heat Exchanger tube side components)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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

Table 3.3.2-12 Nonsafety-Related Service 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	Copper	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	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
		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.2.1.27)	VII.C1.AP-133	3.3.1-99	A
					One-Time Inspection (B.2.1.22)	VII.C1.AP-133	3.3.1-99	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
					Selective Leaching (B.2.1.23)	VII.C1.A-47	3.3.1-72	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)	VIII.E.SP-117	3.4.1-19	C
Pump Casing	Leakage Boundary	Gray Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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.2.1.23)	VII.C1.A-51	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.2.1.25)	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

Table 3.3.2-12 Nonsafety-Related Service 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	Cast Austenitic Stainless Steel (CASS)	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)	VIII.E.SP-117	3.4.1-19	C
		Copper Alloy	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	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
		Ductile Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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
		Gray Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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.2.1.23)	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
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VIII.E.SP-117	3.4.1-19	C

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 3.3.2-13
Plant Drainage System
Summary of Aging Management Evaluation

Table 3.3.2-13 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
		Stainless Steel Bolting	Air/Gas - Wetted (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VII.D.AP-121	3.3.1-12	A
				Loss of Preload	Bolting Integrity (B.2.1.11)			H, 1
Flow Device	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
		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.2.1.26)	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
			Waste Water (Internal)	None	None	VII.J.AP-277	3.3.1-119	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.2.1.26)	VII.E5.AP-278	3.3.1-95	A

Table 3.3.2-13 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	Filter	Copper Alloy with less than 15% Zinc	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
		Ductile Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air - Outdoor (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.H1.A-24	3.3.1-80	A
		Gray Cast Iron	Air - Outdoor (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	VII.H1.A-24	3.3.1-80	E, 2
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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.2.1.26)	VII.E5.AP-281	3.3.1-91	A
		Ductile Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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.2.1.26)	VII.E5.AP-281	3.3.1-91	A
		Galvanized Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-13	3.3.1-116	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-281	3.3.1-91	A

Table 3.3.2-13 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	Gray Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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.2.1.26)	VII.E5.AP-281	3.3.1-91	A
					Selective Leaching (B.2.1.23)			G
		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.2.1.26)	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.2.1.25)	VII.I.A-77	3.3.1-78	A
			Concrete	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.2.1.26)	VII.E5.AP-281	3.3.1-91	A
		Ductile Cast Iron	Concrete	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.2.1.26)	VII.E5.AP-281	3.3.1-91	A
		Galvanized Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-13	3.3.1-116	A
			Concrete	None	None	VII.J.AP-282	3.3.1-112	A

Table 3.3.2-13 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	Pressure Boundary	Galvanized Steel	Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-281	3.3.1-91	A
		Gray Cast Iron	Concrete	None	None	VII.J.AP-282	3.3.1-112	A
			Soil (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	VII.G.AP-198	3.3.1-106	A
					Selective Leaching (B.2.1.23)	VII.G.A-02	3.3.1-72	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-281	3.3.1-91	A
					Selective Leaching (B.2.1.23)			G
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Wetted (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)			G, 3
			Concrete	None	None	VII.J.AP-19	3.3.1-120	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-278	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.2.1.25)	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.2.1.26)	VII.E5.AP-281	3.3.1-91	A

Table 3.3.2-13 Plant Drainage 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/Gas - Wetted (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)			G, 3
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-278	3.3.1-95	A

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 the airspace of the Reactor Enclosure sumps in an air/gas-wetted (external) environment. The loss of preload will be managed by the Bolting Integrity (B.2.1.11) program.

2. These components are underground located in a vault and are in contact with air. These components will be managed by the Buried and Underground Piping and Tanks (B.2.1.29) program.

3. These components are in the airspace of the Reactor Enclosure sumps in an air/gas-wetted (external) environment. The loss of material will be managed by the External Surfaces Monitoring of Mechanical Components (B.2.1.25) program.

Table 3.3.2-14
Primary Containment Instrument Gas System
Summary of Aging Management Evaluation

Table 3.3.2-14 Primary Containment Instrument Gas System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Accumulator (ADS)	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
Accumulator (Instrument Gas Bottles)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-6	3.3.1-121	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
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	A
		Copper	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	A

Table 3.3.2-14 Primary Containment Instrument Gas 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	Ductile Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	A
		Gray Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	A
		Nickel Alloy	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-16	3.3.1-118	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-274	3.3.1-95	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F1.AP-99	3.3.1-94	C
	Pressure Boundary	Aluminum	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-135	3.3.1-113	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-37	3.3.1-113	A
		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

Table 3.3.2-14 Primary Containment Instrument Gas 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/Gas - Dry (Internal)	None	None	VII.J.AP-22	3.3.1-120	A
			Air/Gas - Wetted (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.AP-81	3.3.1-56	A
					Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F1.AP-99	3.3.1-94	C
	Structural Support	Aluminum Alloy	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-135	3.3.1-113	A
			Air/Gas - Wetted (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.F1.AP-142	3.3.1-92	E, 1
		Copper	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Air/Gas - Wetted (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.AP-240	3.3.1-54	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Wetted (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.AP-81	3.3.1-56	A
					Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F1.AP-99	3.3.1-94	C
Strainer (Element)	Filter	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
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	A

Table 3.3.2-14 Primary Containment Instrument Gas 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/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	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 - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F1.AP-99	3.3.1-94	C
	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
			Air/Gas - Wetted (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.AP-81	3.3.1-56	A
					Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F1.AP-99	3.3.1-94	C
		Zinc	Air - Indoor, Uncontrolled (External)	None	None			F, 2
			Air/Gas - Dry (Internal)	None	None			F, 2
	Structural Support	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Wetted (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.AP-81	3.3.1-56	A

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 Compressed Air Monitoring program (B.2.1.15) is substituted to manage the aging effect applicable to this component type, material, and environment combination.

2. Component is a zinc die cast and has no aging effects in an air-indoor, uncontrolled (external) or air/gas-dry (internal) environment.

Table 3.3.2-15
Primary Containment Leak Testing System
Summary of Aging Management Evaluation

Table 3.3.2-15 Primary Containment Leak Testing 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.2.1.25)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	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
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-273	3.3.1-95	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	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

Table 3.3.2-15 Primary Containment Leak Testing 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/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-273	3.3.1-95	A
	Structural Support	Copper	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	A
Valve Body	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	A
Valve Body	Pressure Boundary	Carbon Steel	Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	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
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-273	3.3.1-95	A

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 3.3.2-16
Primary Containment Ventilation System
Summary of Aging Management Evaluation

Table 3.3.2-16 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	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F3.A-105	3.3.1-78	A
					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
Ducting and Components	Leakage Boundary	Stainless Steel	Air/Gas - Wetted (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	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.2.1.26)	VII.E5.AP-278	3.3.1-95	C
	Pressure Boundary	Aluminum	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-36	3.3.1-113	C
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F3.AP-142	3.3.1-92	C
		Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F3.A-10	3.3.1-78	A

Table 3.3.2-16 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
Ducting and Components	Pressure Boundary	Carbon Steel	Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F3.A-08	3.3.1-90	A
		Elastomer	Air - Indoor, Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F3.AP-102	3.3.1-76	A
			Air/Gas - Wetted (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			G
		Galvanized Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-13	3.3.1-116	C
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F3.A-08	3.3.1-90	A
Flexible Connection	Pressure Boundary	Elastomer	Air - Indoor, Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F3.AP-102	3.3.1-76	A
				Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F3.AP-113	3.3.1-82	A
			Air/Gas - Wetted (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			G
				Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			G
Flow Device	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	A

Table 3.3.2-16 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
Flow Device	Leakage Boundary	Carbon Steel	Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	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
		Glass	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Air/Gas - Wetted (Internal)	None	None	VII.J.AP-97	3.3.1-117	A
			Closed Cycle Cooling Water (Internal)	None	None	VII.J.AP-166	3.3.1-117	A
Heat Exchanger Components (CRD Repair Room and CRD Repair Office Cooling Coils)	Leakage Boundary	Copper	Air/Gas - Wetted (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	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 Components (Drywell Unit Cooler Coils)	Leakage Boundary	Copper	Air/Gas - Wetted (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	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 Components (FWH Access Area Unit Cooler Tube Side Components)	Leakage Boundary	Copper	Air/Gas - Wetted (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	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

Table 3.3.2-16 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 Components (Gaseous Radwaste Hydrogen Analyzer Sample Cooler Shell Side Components)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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 Components (Reactor Enclosure and Refuel Floor Air Supply Cooling Coils)	Leakage Boundary	Copper	Air/Gas - Wetted (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	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 Components (Recirc Pump Motor Air Coolers)	Leakage Boundary	Copper Alloy	Air/Gas - Wetted (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	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
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	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
		Copper	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A

Table 3.3.2-16 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	Copper	Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F3.AP-199	3.3.1-46	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)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F3.AP-199	3.3.1-46	A
					Selective Leaching (B.2.1.23)	VII.F3.AP-43	3.3.1-72	A
		Glass	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Air/Gas - Wetted (Internal)	None	None	VII.J.AP-97	3.3.1-117	A
			Closed Cycle Cooling Water (Internal)	None	None	VII.J.AP-166	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
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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
		Copper	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.F3.AP-199	3.3.1-46	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)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F3.AP-199	3.3.1-46	A

Table 3.3.2-16 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	Pressure Boundary	Copper Alloy with 15% Zinc or More	Closed Cycle Cooling Water (Internal)	Loss of Material	Selective Leaching (B.2.1.23)	VII.F3.AP-43	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
Tanks	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-280	3.3.1-95	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
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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
		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)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F3.AP-199	3.3.1-46	A
					Selective Leaching (B.2.1.23)	VII.F3.AP-43	3.3.1-72	A
		Gray Cast Iron	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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
					Selective Leaching (B.2.1.23)	VII.F3.A-50	3.3.1-72	A

Table 3.3.2-16 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	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
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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
		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

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.2.1.26) program is used to manage the applicable aging effects.

Table 3.3.2-17
Process Radiation Monitoring System
Summary of Aging Management Evaluation

Table 3.3.2-17 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
Flow Device	Pressure Boundary	Glass	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Air/Gas - Wetted (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 - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F2.AP-99	3.3.1-94	C
Heat Exchanger Components	Leakage Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F2.AP-99	3.3.1-94	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-110	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	C

Table 3.3.2-17 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
Hoses	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.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A
	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	Open-Cycle Cooling Water System (B.2.1.12)	VIII.F.SP-117	3.4.1-21	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.2.1.25)	VII.D.A-80	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
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	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)	VIII.E.SP-117	3.4.1-19	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	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

Table 3.3.2-17 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	Pressure Boundary	Stainless Steel	Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F2.AP-99	3.3.1-94	C
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VIII.F.SP-117	3.4.1-21	C
Pump Casing	Leakage Boundary	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.2.1.22)	VII.E3.AP-140	3.3.1-22	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-140	3.3.1-22	A
	Pressure Boundary	Aluminum	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-135	3.3.1-113	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F2.AP-142	3.3.1-92	A
		Copper Alloy with less than 15% Zinc	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	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
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	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
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A

Table 3.3.2-17 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	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VIII.F.SP-117	3.4.1-21	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	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
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F2.AP-99	3.3.1-94	C
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VIII.F.SP-117	3.4.1-21	C

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 3.3.2-18
Process and Post-Accident Sampling System
Summary of Aging Management Evaluation

Table 3.3.2-18 Process and Post-Accident Sampling 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
Flow Device	Leakage Boundary	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.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A
Hoses	Leakage Boundary	Elastomer	Treated Water (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.A4.AP-101	3.3.1-86	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	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.2.1.25)	VII.D.A-80	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	A

Table 3.3.2-18 Process and Post-Accident Sampling 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
			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.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A
			Treated Water > 140°F (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VII.E3.AP-120	3.3.1-19	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-120	3.3.1-19	C
				Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A
Pump Casing	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.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A
Tanks	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.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A
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
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-140	3.3.1-22	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-140	3.3.1-22	A

Table 3.3.2-18 Process and Post-Accident Sampling 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.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A
			Treated Water > 140°F (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VII.E3.AP-120	3.3.1-19	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-120	3.3.1-19	C
				Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A

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
Radwaste System
Summary of Aging Management Evaluation

Table 3.3.2-19 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
Flow Device	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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.2.1.26)	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
Heat Exchanger Components (Gaseous Radwaste Aftercondenser 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.2.1.22)	VII.E3.AP-112	3.3.1-20	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-112	3.3.1-20	A

Table 3.3.2-19 Radwaste System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Heat Exchanger Components (Gaseous Radwaste Aftercondenser Shell Side Components)	Leakage Boundary	Stainless Steel	Treated Water > 140°F (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.A4.AP-111	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-111	3.3.1-25	A
Heat Exchanger Components (Gaseous Radwaste Hydrogen Analyzer Sample Cooler Tube Side Components)	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.2.1.22)	VII.A4.AP-111	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-111	3.3.1-25	A
Heat Exchanger Components (Gaseous Radwaste Preheater Shell Side Components)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-106	3.3.1-21	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	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.2.1.25)	VII.I.A-77	3.3.1-78	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.2.1.22)	VII.E3.AP-106	3.3.1-21	A

Table 3.3.2-19 Radwaste 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	Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	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.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A
			Treated Water > 140°F (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VII.E3.AP-112	3.3.1-20	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-112	3.3.1-20	C
				Cumulative Fatigue Damage	TLAA	VII.E3.A-62	3.3.1-2	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	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.2.1.25)	VII.I.A-77	3.3.1-78	A

Table 3.3.2-19 Radwaste 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/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	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
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F1.AP-99	3.3.1-94	C
			Waste Water > 140°F (Internal)	Cracking	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			G
				Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-278	3.3.1-95	A
Pump Casing (Condensate Backwash Transfer Pumps)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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.2.1.26)	VII.E5.AP-281	3.3.1-91	A
Recombiners (Gaseous Radwaste)	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.2.1.22)	VII.E3.AP-112	3.3.1-20	C

Table 3.3.2-19 Radwaste System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Recombiners (Gaseous Radwaste)	Leakage Boundary	Stainless Steel	Treated Water > 140°F (Internal)	Cracking	Water Chemistry (B.2.1.2)	VII.E3.AP-112	3.3.1-20	C
				Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-110	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	C
Tanks (Condensate Backwash Receiving Tanks)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	C
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-281	3.3.1-91	A
Tanks (Drywell Floor Drain Sump and Drywell Equipment Drain Tank)	Pressure Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	C
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F1.AP-99	3.3.1-94	C
			Waste Water > 140°F (Internal)	Cracking	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			G
				Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-278	3.3.1-95	A

Table 3.3.2-19 Radwaste System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Tanks (Gaseous Radwaste Hydrogen Analyzer Surge Tank Assemblies)	Leakage Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	C
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F1.AP-99	3.3.1-94	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-110	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	C
Tanks (Reactor Water Cleanup Backwash Receiving Tanks)	Leakage Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	C
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F1.AP-99	3.3.1-94	C
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-278	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.2.1.25)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-281	3.3.1-91	A

Table 3.3.2-19 Radwaste 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.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	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.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	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
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F1.AP-99	3.3.1-94	C
			Waste Water > 140°F (Internal)	Cracking	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			G
				Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-278	3.3.1-95	A

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 3.3.2-20
Reactor Enclosure Ventilation System
Summary of Aging Management Evaluation

Table 3.3.2-20 Reactor Enclosure 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	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F2.A-105	3.3.1-78	A
					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	Air/Gas - Wetted (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F2.AP-99	3.3.1-94	A, 2
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-278	3.3.1-95	C
	Pressure Boundary	Aluminum	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-135	3.3.1-113	C
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	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.2.1.25)	VII.F2.A-10	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F2.A-08	3.3.1-90	A
		Galvanized Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-13	3.3.1-116	C

Table 3.3.2-20 Reactor Enclosure 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	Galvanized Steel	Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F2.A-08	3.3.1-90	A
Flexible Connection	Pressure Boundary	Elastomer	Air - Indoor, Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F2.AP-102	3.3.1-76	A
				Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F2.AP-113	3.3.1-82	A
			Air/Gas - Wetted (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			G
				Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			G
Flow Device	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	A
		Glass	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Air/Gas - Wetted (Internal)	None	None	VII.J.AP-97	3.3.1-117	A
Heat Exchanger Components (Core Spray Pump Room Unit Cooler Air Side Components)	Heat Transfer	Copper Alloy with less than 15% Zinc	Air/Gas - Wetted (External)	Reduction of Heat Transfer	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			H, 1

Table 3.3.2-20 Reactor Enclosure 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 Components (Core Spray Pump Room Unit Cooler Air Side Components)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F2.AP-41	3.3.1-80	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F2.A-08	3.3.1-90	C
		Copper Alloy with less than 15% Zinc	Air/Gas - Wetted (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	C
Heat Exchanger Components (HPCI Pump Room Unit Cooler Air Side Components)	Heat Transfer	Copper Alloy with less than 15% Zinc	Air/Gas - Wetted (External)	Reduction of Heat Transfer	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			H, 1
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F2.AP-41	3.3.1-80	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F2.A-08	3.3.1-90	C
		Copper Alloy with less than 15% Zinc	Air/Gas - Wetted (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	C
Heat Exchanger Components (RCIC Pump Room Unit Cooler Air Side Components)	Heat Transfer	Copper Alloy with less than 15% Zinc	Air/Gas - Wetted (External)	Reduction of Heat Transfer	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			H, 1

Table 3.3.2-20 Reactor Enclosure 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 Components (RCIC Pump Room Unit Cooler Air Side Components)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F2.AP-41	3.3.1-80	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F2.A-08	3.3.1-90	C
		Copper Alloy with less than 15% Zinc	Air/Gas - Wetted (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	C
Heat Exchanger Components (RHR Pump Room Unit Cooler Air Side Components)	Heat Transfer	Copper Alloy with less than 15% Zinc	Air/Gas - Wetted (External)	Reduction of Heat Transfer	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			H, 1
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F2.AP-41	3.3.1-80	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F2.A-08	3.3.1-90	C
		Copper Alloy with less than 15% Zinc	Air/Gas - Wetted (External)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.AP-143	3.3.1-89	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.2.1.25)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	A

Table 3.3.2-20 Reactor Enclosure 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	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	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
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F2.AP-99	3.3.1-94	C

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 Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) program is used to manage the aging effect(s) applicable to this component type, material, and environment combination.

2. 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.2.1.26) program is used to manage the applicable aging effects.

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
		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
Flow Device	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.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
Heat Exchanger Components ("A" RWCU Pump Motor Heat Exchanger Shell Side Components)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.E.SP-77	3.4.1-15	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-77	3.4.1-15	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
Heat Exchanger Components ("B" and "C" RWCU Pump Seal Heat Exchanger Tube Side Components)	Leakage Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Treated Water > 140°F (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VII.E3.AP-112	3.3.1-20	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-112	3.3.1-20	A
				Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-110	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	C
Heat Exchanger Components (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.2.1.25)	VII.I.A-77	3.3.1-78	A
			Treated Water > 140°F (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VII.E3.AP-112	3.3.1-20	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-112	3.3.1-20	A
				Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-110	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	C
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Treated Water > 140°F (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VII.E3.AP-112	3.3.1-20	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-112	3.3.1-20	A
				Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-110	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	C

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 Components (Regenerative Heat Exchanger Tube and Shell 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.2.1.25)	VII.I.A-77	3.3.1-78	A
			Treated Water > 140°F (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VII.E3.AP-120	3.3.1-19	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-120	3.3.1-19	A
				Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-110	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	C
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Treated Water > 140°F (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VII.E3.AP-120	3.3.1-19	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-120	3.3.1-19	A
				Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-110	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	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.2.1.25)	VII.I.A-77	3.3.1-78	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VII.E4.AP-127	3.3.1-97	A
					One-Time Inspection (B.2.1.22)	VII.E4.AP-127	3.3.1-97	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	A
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.D2.S-16	3.4.1-5	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
Piping, piping components, and piping elements	Leakage Boundary	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
			Treated Water (Internal)	Cumulative Fatigue Damage	TLAA	VII.E3.A-62	3.3.1-2	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A
			Treated Water > 140°F (Internal)	Cracking	BWR Reactor Water Cleanup System (B.2.1.16)	VII.E3.AP-283	3.3.1-16	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-283	3.3.1-16	A
				Cumulative Fatigue Damage	TLAA	VII.E3.A-62	3.3.1-2	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	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.2.1.22)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	A
				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	VII.J.AP-17	3.3.1-120	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
Piping, piping components, and piping elements	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A
			Treated Water > 140°F (Internal)	Cracking	BWR Reactor Water Cleanup System (B.2.1.16)	VII.E3.AP-283	3.3.1-16	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-283	3.3.1-16	A
				Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A
Pump Casing ("A" RWCU Pump)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	A
Pump Casing ("B/C" RWCU Pump)	Leakage Boundary	Cast Austenitic Stainless Steel (CASS)	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Treated Water > 482°F (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VII.E3.AP-112	3.3.1-20	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-112	3.3.1-20	C
				Loss of Fracture Toughness	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	IV.C1.R-08	3.1.1-38	E, 2
				Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	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 (Filter Demineralizer Precoat and Holding)	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.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A
Tanks (Filter Demineralizer)	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.2.1.25)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-110	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	C
Tanks (Precoat)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-106	3.3.1-21	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	C
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	A
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.D2.S-16	3.4.1-5	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	Cast Austenitic Stainless Steel (CASS)	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.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	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.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A
			Treated Water > 140°F (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VII.E3.AP-112	3.3.1-20	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-112	3.3.1-20	C
				Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	A
				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	VII.J.AP-17	3.3.1-120	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A
			Treated Water > 140°F (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VII.E3.AP-112	3.3.1-20	C

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	Pressure Boundary	Stainless Steel	Treated Water > 140°F (Internal)	Cracking	Water Chemistry (B.2.1.2)	VII.E3.AP-112	3.3.1-20	C
				Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A

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 Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) program is substituted to manage the aging effect for this component type, material and environment combination.

Table 3.3.2-22
Safety Related Service Water System
Summary of Aging Management Evaluation

Table 3.3.2-22 Safety Related Service 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
			Air - Outdoor (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	VII.I.AP-126	3.3.1-12	E, 1
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-263	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
Expansion Joints (EDG HTX)	Pressure Boundary	Elastomer	Air - Indoor, Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F4.AP-102	3.3.1-76	A
			Raw Water (Internal)	Hardening and Loss of Strength	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-75	3.3.1-32x	A
Expansion Joints (RHR motor oil cooler)	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	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	A
Flow Device	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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

Table 3.3.2-22 Safety Related Service Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Flow Device	Leakage Boundary	Glass	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-14	3.3.1-117	A
			Raw Water (Internal)	None	None	VII.J.AP-50	3.3.1-117	A
Heat Exchanger Components (ECCS Room Coolers)	Heat Transfer	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
				Reduction of Heat Transfer	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-72	3.3.1-42	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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
		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 Components (EDG HTX)	Heat Transfer	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
				Reduction of Heat Transfer	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-72	3.3.1-42	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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
		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 Components (MCR Chiller Condenser)	Heat Transfer	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

Table 3.3.2-22 Safety Related Service 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 Components (MCR Chiller Condenser)	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
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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
		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 Components (RHR HTX)	Heat Transfer	Stainless Steel	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	V.D2.EP-91	3.2.1-25	A
				Reduction of Heat Transfer	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-187	3.3.1-42	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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
		Carbon or Low Alloy Steel with Stainless Steel Cladding	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	V.D2.EP-91	3.2.1-25	A
		Stainless Steel	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	V.D2.EP-91	3.2.1-25	A
Heat Exchanger Components (RHR Pump Motor Oil Cooler)	Heat Transfer	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
				Reduction of Heat Transfer	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-72	3.3.1-42	A

Table 3.3.2-22 Safety Related Service 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 Components (RHR Pump Motor Oil Cooler)	Heat Transfer	Stainless Steel	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	V.D2.EP-91	3.2.1-25	A
				Reduction of Heat Transfer	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-187	3.3.1-42	A
	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
		Stainless Steel	Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	V.D2.EP-91	3.2.1-25	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.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air - Outdoor (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	VII.H1.A-24	3.3.1-80	E, 1
			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.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air - Outdoor (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	VII.H1.A-24	3.3.1-80	E, 1
					External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.H1.A-24	3.3.1-80	A
			Air/Gas - Wetted (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.G.A-23	3.3.1-89	E, 2

Table 3.3.2-22 Safety Related Service 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
			Soil (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	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	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.G.A-23	3.3.1-89	E, 2
			Raw Water (External)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	C
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	C
Spray Nozzles	Spray	Stainless Steel	Air - Outdoor (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.C3.AP-221	3.3.1-6	A
			Air/Gas - Wetted (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.D.AP-81	3.3.1-56	E, 2
			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	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air - Outdoor (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	VII.H1.A-24	3.3.1-80	E, 1
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	C

Table 3.3.2-22 Safety Related Service 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	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air - Outdoor (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	VII.C3.AP-221	3.3.1-6	E, 1
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	A

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 and Tanks (B.2.1.29) 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.

Table 3.3.2-23
Spray Pond Pump House Ventilation System
Summary of Aging Management Evaluation

Table 3.3.2-23 Spray Pond Pump House 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	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F4.A-105	3.3.1-78	A, 1
Ducting and Components	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F4.A-10	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F4.A-08	3.3.1-90	A
		Elastomer	Air - Indoor, Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F4.AP-102	3.3.1-76	A
			Air/Gas - Wetted (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			G
		Galvanized Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-13	3.3.1-116	C
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F4.A-08	3.3.1-90	A
Flexible Connection	Pressure Boundary	Elastomer	Air - Indoor, Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F4.AP-102	3.3.1-76	A
				Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F4.AP-113	3.3.1-82	A

Table 3.3.2-23 Spray Pond Pump House 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	Elastomer	Air/Gas - Wetted (Internal)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			G
				Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			G

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 ductwork closure bolting, which is not subject to significant thermal effects or pressure loads. The loss of material will be managed by the External Surfaces Monitoring of Mechanical Components (B.2.1.25) program.

Table 3.3.2-24
Standby Liquid Control System
Summary of Aging Management Evaluation

Table 3.3.2-24 Standby Liquid Control System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Accumulator (1A, 1B, 1C, 2B)	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	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.2.1.22)	VII.A4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	A
Accumulator (2A, 2C)	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.2.1.22)	VII.A4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	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
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A

Table 3.3.2-24 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	Carbon Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.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
			Sodium Pentaborate Solution (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E2.AP-141	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E2.AP-141	3.3.1-25	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.A4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	A
	Pressure Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Sodium Pentaborate Solution (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E2.AP-141	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E2.AP-141	3.3.1-25	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.A4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	A
Pump Casing	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Sodium Pentaborate Solution (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E2.AP-141	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E2.AP-141	3.3.1-25	A

Table 3.3.2-24 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
Pump Casing	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.A4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	A
Tanks	Leakage Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	C
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.A.EP-81	3.2.1-48	A
			Sodium Pentaborate Solution (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E2.AP-141	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.E2.AP-141	3.3.1-25	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.E.SP-75	3.4.1-12	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-75	3.4.1-12	A
	Pressure Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	C
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	V.A.EP-81	3.2.1-48	A
			Sodium Pentaborate Solution (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E2.AP-141	3.3.1-25	C
					Water Chemistry (B.2.1.2)	VII.E2.AP-141	3.3.1-25	C
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A

Table 3.3.2-24 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	Leakage Boundary	Stainless Steel	Sodium Pentaborate Solution (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E2.AP-141	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E2.AP-141	3.3.1-25	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.A4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	A
	Pressure Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Sodium Pentaborate Solution (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E2.AP-141	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E2.AP-141	3.3.1-25	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.A4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	A

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
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.2.1.25)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Wetted (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.A-26	3.3.1-55	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Wetted (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.AP-81	3.3.1-56	A
	Structural Support	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Wetted (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.AP-81	3.3.1-56	A
Valve Body	Pressure Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Wetted (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.AP-81	3.3.1-56	A
	Structural Support	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Wetted (Internal)	Loss of Material	Compressed Air Monitoring (B.2.1.15)	VII.D.AP-81	3.3.1-56	A

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 3.3.2-26
Water Treatment and Distribution System
Summary of Aging Management Evaluation

Table 3.3.2-26 Water Treatment and Distribution 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.2.1.25)	VII.I.A-77	3.3.1-78	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	V.D2.EP-90	3.2.1-23	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	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.2.1.22)	VIII.A.SP-101	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.A.SP-101	3.4.1-16	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.2.1.22)	VII.A4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	A
Pump Casing	Leakage Boundary	Copper Alloy with less than 15% Zinc	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A

Table 3.3.2-26 Water Treatment and Distribution System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Pump Casing	Leakage Boundary	Copper Alloy with less than 15% Zinc	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.A.SP-101	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.A.SP-101	3.4.1-16	A
Tanks	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-106	3.3.1-21	C
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	C
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	V.D2.EP-90	3.2.1-23	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	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.2.1.22)	VIII.A.SP-101	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.A.SP-101	3.4.1-16	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.2.1.22)	VII.A4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	A

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 <u>AGING MANAGEMENT OF STEAM AND POWER CONVERSION SYSTEM</u>

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.

- Circulating Water System (2.3.4.1)
- Condensate System (2.3.4.2)
- Condenser and Air Removal System (2.3.4.3)
- Extraction Steam System (2.3.4.4)
- Feedwater System (2.3.4.5)
- Main Steam System (2.3.4.6)
- Main Turbine (2.3.4.7)

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 Circulating Water System Summary of Aging Management Evaluation

Table 3.4.2-2 Condensate System Summary of Aging Management Evaluation

Table 3.4.2-3 Condenser and Air Removal System Summary of Aging Management Evaluation

Table 3.4.2-4 Extraction Steam System Summary of Aging Management Evaluation

Table 3.4.2-5 Feedwater System Summary of Aging Management Evaluation

Table 3.4.2-6 Main Steam System Summary of Aging Management Evaluation

Table 3.4.2-7 Main Turbine Summary of Aging Management Evaluation

3.4.2.1 <u>Materials, Environments, Aging Effects Requiring Management And Aging Management Programs</u>

3.4.2.1.1 Circulating Water System

Materials

The materials of construction for the Circulating Water System components are:

- Carbon Steel

- Carbon and Low Alloy Steel Bolting
- Elastomer
- Glass
- Polymer
- Stainless Steel
- Stainless Steel Bolting

Environments

The Circulating Water System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air - Outdoor
- Raw Water
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Circulating Water 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 Circulating Water System components:

- Bolting Integrity (B.2.1.11)
- Buried and Underground Piping and Tanks (B.2.1.29)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Open-Cycle Cooling Water System (B.2.1.12)

3.4.2.1.2 Condensate System

Materials

The materials of construction for the Condensate System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Glass
- Stainless Steel

Environments

The Condensate System 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 Condensate System components require management:

- Loss of Material
- Loss of Preload
- Wall Thinning

Aging Management Programs

The following aging management programs manage the aging effects for the Condensate System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Flow-Accelerated Corrosion (B.2.1.10)
- One-Time Inspection (B.2.1.22)
- Water Chemistry (B.2.1.2)

3.4.2.1.3 Condenser and Air Removal System

Materials

The materials of construction for the Condenser and Air Removal System components are:

- Aluminum
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Copper
- Glass
- Stainless Steel

Environments

The Condenser and Air Removal System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air/Gas - Wetted
- Treated Water
- Treated Water > 140°F

Aging Effects Requiring Management

The following aging effects associated with the Condenser and Air Removal 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 Condenser and Air Removal System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Flow-Accelerated Corrosion (B.2.1.10)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)
- One-Time Inspection (B.2.1.22)
- TLAA
- Water Chemistry (B.2.1.2)

3.4.2.1.4 Extraction Steam System

Materials

The materials of construction for the Extraction Steam System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Glass
- Stainless Steel

Environments

The Extraction Steam 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 Extraction 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 Extraction Steam System components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Flow-Accelerated Corrosion (B.2.1.10)
- One-Time Inspection (B.2.1.22)
- TLAA
- Water Chemistry (B.2.1.2)

3.4.2.1.5 Feedwater System

Materials

The materials of construction for the Feedwater System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Glass
- 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.2.1.25)
- Flow-Accelerated Corrosion (B.2.1.10)
- One-Time Inspection (B.2.1.22)
- TLAA
- Water Chemistry (B.2.1.2)

3.4.2.1.6 Main Steam System

Materials

The materials of construction for the Main Steam System components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Glass
- Stainless Steel

Environments

The Main Steam System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air/Gas - Wetted
- 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.2.1.25)
- Flow-Accelerated Corrosion (B.2.1.10)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)
- One-Time Inspection (B.2.1.22)
- TLAA
- Water Chemistry (B.2.1.2)

3.4.2.1.7 Main Turbine

Materials

The materials of construction for the Main Turbine components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Glass
- Stainless Steel

Environments

The Main Turbine components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air/Gas - Dry
- Air/Gas - Wetted
- Lubricating Oil
- Steam

- Treated Water
- Treated Water > 140°F

Aging Effects Requiring Management

The following aging effects associated with the Main Turbine 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 Turbine components:

- Bolting Integrity (B.2.1.11)
- External Surfaces Monitoring of Mechanical Components (B.2.1.25)
- Flow-Accelerated Corrosion (B.2.1.10)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)
- Lubricating Oil Analysis (B.2.1.27)
- One-Time Inspection (B.2.1.22)
- TLAA
- 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 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 Auxiliary Steam System, Condenser and Air Removal System, Extraction Steam System, Feedwater System, High Pressure Coolant Injection System, Main Steam System, Main Turbine System, Radwaste System, Reactor Coolant Pressure Boundary, Reactor Core Isolation Cooling System, and Reactor Water Cleanup System is discussed in Sections 4.3.1, 4.3.2, 4.3.3, and 4.6.8.

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.

Item Number 3.4.1-2 is not applicable to LGS. Stress corrosion cracking (SCC) is a mechanism requiring a tensile stress, a corrosive environment, and a susceptible material in order to occur. SCC of stainless steels exposed to outdoor air and contaminants is considered plausible only if the material temperature is above 140 degrees F. For the Steam and Power Conversion systems, the outdoor stainless steel components are less than 140 degrees F. Therefore, SCC is not applicable for stainless steel surfaces in an outdoor air environment in Steam and Power Conversion systems at LGS.

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.

LGS will implement the External Surfaces Monitoring of Mechanical Components (B.2.1.25) program to manage the loss of material in stainless steel piping, piping components, and piping elements exposed to an outdoor air environment in the Circulating Water and Condensate systems. The External Surfaces Monitoring of Mechanical Components (B.2.1.25) 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 the 10 CFR Part 50, Appendix B Corrective Action Program. The External Surfaces Monitoring of Mechanical Components (B.2.1.25) 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.

3.4.2.3 <u>Time-Limited Aging Analysis</u>

The time-limited aging analyses identified below are associated with the Steam and Power Conversion systems components:

- Section 4.3, Metal Fatigue
    - Section 4.3.1, ASME Section III, Class I Fatigue Analyses
    - Section 4.3.2, ASME Section III, Class 2 and 3 and ANSI B31.1 Allowable Stress Calculations
    - Section 4.3.3, Environmental Fatigue Analyses for RPV and Class 1 Piping
- Section 4.6, Other Plant- Specific Time-Limited Aging Analyses
    - Section 4.6.8, Downcomers and MSRV Discharge Piping Fatigue Analyses

3.4.3 CONCLUSION

The Steam and Power Conversion 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 Steam and Power Conversion Systems 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 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.

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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 (See subsection 3.4.2.2.1)	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 (See subsection 3.4.2.2.2)	Not applicable. 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 (See subsection 3.4.2.2.3)	Consistent with NUREG-1801. The External Surfaces Monitoring of Mechanical Components (B.2.1.25) program will be used to manage the loss of material of stainless steel piping, piping components, and piping elements exposed to air-outdoor in the Circulating Water and Condensate systems. Further evaluation is documented in 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, piping elements, tanks, and heat exchanger components exposed to steam and treated water in the Auxiliary Steam, Reactor Water Cleanup, Condensate, Condenser and Air Removal, Extraction Steam, Feedwater, Main Steam and Main Turbine systems.
3.4.1-6	Steel, Stainless Steel Bolting exposed to Soil	Loss of preload	Chapter XI.M18, "Bolting Integrity "	No	Not applicable. There is no steel or stainless steel bolting exposed to soil in the Steam and Power Conversion systems.
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 is no steel high strength bolting exposed to air with steam or water leakage in the Steam and Power Conversion systems.

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
3.4.1-8	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 in carbon and low alloy steel bolting exposed to air-indoor, uncontrolled, and stainless steel bolting exposed to air-outdoor in the Circulating Water, Condensate, Condenser and Air Removal, Extraction Steam, Feedwater, Main Steam, and Main Turbine systems.
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 systems.
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 steel, low alloy steel, and stainless steel bolting exposed to air-outdoor and air-indoor, uncontrolled in the Circulating Water, Condensate, Condenser and Air Removal, Extraction Steam, Feedwater, Main Steam, and Main Turbine systems.

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
3.4.1-11	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. The Water Chemistry (B.2.1.2) program and One-Time Inspection (B.2.1.22) program will be used to manage cracking of the stainless steel piping, piping components, and piping elements that are exposed to steam and treated water >60°C (>140°F) in the High Pressure Coolant Injection, Reactor Core Isolation Cooling, Reactor Coolant Pressure Boundary, Condenser and Air Removal, Extraction Steam, Feedwater, Main Steam, and Main Turbine systems.
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. The Water Chemistry (B.2.1.2) program and One-Time Inspection (B.2.1.22) program will be used to manage loss of material of carbon steel and stainless steel tanks exposed to treated water in the Standby Liquid Control and Condenser and Air Removal systems.
3.4.1-13	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
3.4.1-14	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. The Water Chemistry (B.2.1.2) program and One-Time Inspection (B.2.1.22) program will be used to manage loss of material for steel piping, piping components, and piping elements, heat exchanger components, and tanks exposed to steam, and treated water in the Reactor Coolant Pressure Boundary, Condensate, Condenser and Air Removal, Extraction Steam, Feedwater, Main Steam, and Main Turbine systems.
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. The Water Chemistry (B.2.1.2) program and One-Time Inspection (B.2.1.22) program will be used to manage loss of material for steel heat exchanger components exposed to treated water in the Reactor Water Cleanup, Condenser and Air Removal, and Main Steam systems.

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
3.4.1-16	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. The Water Chemistry (B.2.1.2) program and One-Time Inspection (B.2.1.22) program will be used to manage loss of material for copper, copper alloy, stainless steel, cast austenitic stainless steel and aluminum piping, piping components, and piping elements, heat exchanger components, and tubes exposed to treated water, treated water> 140 °F, and steam in the Water Treatment and Distribution, High Pressure Coolant Injection, Reactor Core Isolation Cooling, Reactor Coolant Pressure Boundary, Condensate, Condenser and Air Removal, Extraction Steam, Feedwater, Main Steam, and Main Turbine systems.
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. The Water Chemistry (B.2.1.2) program and One-Time Inspection (B.2.1.22) program will be used to manage reduction of heat transfer for copper alloy with 15 percent zinc or more heat exchanger tubes exposed to treated water in the High Pressure Coolant Injection and Reactor Core Isolation Cooling systems.

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
3.4.1-19	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	Consistent with NUREG-1801. The Open-Cycle Cooling Water System (B.2.1.12) will be used to manage loss of material of stainless steel, cast austenitic stainless steel, and steel piping, piping components and piping elements exposed to raw water in the Nonsafety-Related Service Water, Process Radiation Monitoring, and Circulating Water systems.
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. The stainless steel piping, piping components and piping elements exposed to raw water with a loss of material aging effect is addressed by Item 3.4.1-21. There is no copper alloy piping, piping components and piping elements exposed to raw water in the Steam and Power Conversion systems.

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
3.4.1-21	Stainless steel Heat exchanger components 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	Consistent with NUREG-1801. The Open-Cycle Cooling Water System (B.2.1.12) program will be used to manage the loss of material of stainless steel piping, piping components, and piping elements exposed to raw water in the Process Radiation Monitoring and Circulating Water systems. The Bolting Integrity (B.2.1.11) program has been substituted and will be used to manage loss of material of the stainless steel bolting exposed to raw water in the cooling tower basin removable screens in the Circulating Water system.
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 heat exchangers with a heat transfer intended function in the Steam and Power Conversion systems.
3.4.1-23	Stainless steel Piping, piping components, and piping elements exposed to Closed-cycle cooling water >60°C (>140°F)	Cracking due to stress corrosion cracking	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 the Steam and Power Conversion systems.

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
3.4.1-24	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 systems.
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 systems.
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 steel heat exchanger components, piping, piping components, and piping elements exposed to closed cycle cooling water in the Steam and Power Conversion systems.
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 systems.

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
3.4.1-28	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, or copper alloy heat exchanger components and heat exchanger tubes exposed to closed-cycle cooling water that have a heat transfer intended function in the Steam and Power Conversion systems.
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 or stainless steel tanks exposed to air-outdoor in the Steam and Power Conversion systems.
3.4.1-30	Steel, Stainless Steel, Aluminum Tanks exposed to Soil or Concrete, Air – outdoor (External)	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.M29, “Aboveground Metallic Tanks”	No	Consistent with NUREG-1801. The Aboveground Metallic Tanks (B.2.1.19) program will be used to manage the loss of material of the carbon steel tank exposed to soil in the Fire Protection system.
3.4.1-31	Stainless steel, Aluminum Tanks exposed to Soil or Concrete	Loss of material due to pitting, and crevice corrosion	Chapter XI.M29, “Aboveground Metallic Tanks”	No	Not applicable. There are no stainless steel or aluminum tanks exposed to soil or concrete in the Steam and Power Conversion systems.

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
3.4.1-32	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 systems.
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 (>15% Zn or 8% Al) piping, piping components, and piping elements exposed to treated water, raw water or closed-cycle cooling water in the Steam and Power Conversion systems.
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.2.1.25) program will be used to manage loss of material of carbon steel piping, piping components, and piping elements, tanks, and heat exchanger components exposed to air-indoor, uncontrolled in the Circulating Water, Condensate, Condenser and Air Removal, Extraction Steam, Feedwater, Main Steam, and Main Turbine systems.

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
3.4.1-35	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	Not applicable. There are no aluminum piping, piping components, and piping elements exposed to an air-outdoor environment in the Steam And Power Conversion systems.
3.4.1-36	PWR Only				
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.2.1.26) program will be used to manage loss of material of carbon steel piping, piping components, and piping elements exposed to air/gas-wetted in the 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	Consistent with NUREG-1801. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) program will be used to manage loss of material of stainless steel piping, piping components, and piping elements and tanks exposed to air/gas-wetted in the Fire Protection, Main Steam and Main Turbine systems.

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
3.4.1-40	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	Consistent with NUREG-1801. The Lubricating Oil Analysis (B.2.1.27) program and One-Time Inspection (B.2.1.22) program will be used to manage loss of material of carbon steel piping, piping components and piping elements exposed to lubricating oil in the Main Turbine system.
3.4.1-41	PWR Only				
3.4.1-42	PWR Only				
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 a lubricating oil environment in the Steam and Power Conversion systems.
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	Consistent with NUREG-1801. The Lubricating Oil Analysis (B.2.1.27) program and One-Time Inspection (B.2.1.22) program will be used to manage loss of material of stainless steel piping, piping components, and piping elements and tanks exposed to lubricating oil in the Main Turbine system.
3.4.1-45	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
3.4.1-46	PWR Only				
3.4.1-47	Steel (with coating or wrapping) Piping, piping components, and piping elements; tanks 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 and Tanks (B.2.1.29) program will be used to manage loss of material of carbon steel (with coating or wrapping) piping, piping components, and piping elements exposed to soil in the Circulating Water system.
3.4.1-48	Stainless Steel 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 bolting exposed to a soil environment in the Steam and Power Conversion systems.
3.4.1-49	Stainless steel 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 is no stainless steel piping, piping components, and piping elements exposed to soil or concrete in the Steam and Power Conversion systems.
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 a soil environment in the Steam and Power Conversion systems.

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
3.4.1-50x	Underground Stainless Steel and 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. This component, material, environment, and aging effect combination is addressed by Item 3.4.1-47.
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 is no steel piping, piping components, and piping elements exposed to concrete in the Steam and Power Conversion systems.
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	Consistent with NUREG-1801.
3.4.1-53	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
3.4.1-54	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 an air-indoor, uncontrolled environment in the Steam and Power Conversion systems.
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 is no nickel alloy or PVC piping, piping components and piping elements exposed to air with borated water leakage, air-indoor, uncontrolled, or condensation in the Steam and Power Conversion systems.

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
3.4.1-58	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	Consistent with NUREG-1801.

Table 3.4.2-1
Circulating Water System
Summary of Aging Management Evaluation

Table 3.4.2-1 Circulating 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)	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
		Stainless Steel Bolting	Air - Outdoor (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VIII.H.SP-82	3.4.1-8	A, 1
				Loss of Preload	Bolting Integrity (B.2.1.11)	VIII.H.SP-151	3.4.1-10	A, 1
			Raw Water (External)	Loss of Material	Bolting Integrity (B.2.1.11)	VIII.F.SP-117	3.4.1-21	E, 1, 2
				Loss of Preload	Bolting Integrity (B.2.1.11)	VII.I.AP-264	3.3.1-15	A, 1
Expansion Joints	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VIII.E.SP-146	3.4.1-19	C
		Elastomer	Air - Indoor, Uncontrolled (External)	Hardening and Loss of Strength	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.F1.AP-102	3.3.1-76	A
			Raw Water (Internal)	Hardening and Loss of Strength	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-75	3.3.1-32x	A
				Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-76	3.3.1-32x	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.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VIII.E.SP-146	3.4.1-19	C

Table 3.4.2-1 Circulating 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	Glass	Air - Indoor, Uncontrolled (External)	None	None	VIII.I.SP-9	3.4.1-55	A
			Raw Water (Internal)	None	None	VIII.I.SP-34	3.4.1-55	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VIII.I.SP-12	3.4.1-58	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VIII.F.SP-117	3.4.1-21	C
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VIII.E.SP-146	3.4.1-19	C
			Soil (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	VIII.E.SP-145	3.4.1-47	A
Strainer (Element)	Filter	Carbon Steel	Air - Outdoor (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.H1.A-24	3.3.1-80	A
			Raw Water (External)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VIII.E.SP-146	3.4.1-19	C
		Polymer	Air - Outdoor (External)	None	None			G, 3
			Raw Water (External)	None	None			G, 3
		Stainless Steel	Air - Outdoor (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.E.SP-127	3.4.1-3	A
			Raw Water (External)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VIII.F.SP-117	3.4.1-21	C
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VIII.E.SP-146	3.4.1-19	C

Table 3.4.2-1 Circulating 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	Air - Indoor, Uncontrolled (External)	None	None	VIII.I.SP-12	3.4.1-58	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VIII.F.SP-117	3.4.1-21	C
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VIII.E.SP-146	3.4.1-19	C

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. Stainless steel bolting materials in Air - Outdoor (External) and Raw Water (External) environments are associated with the cooling tower basin removable screens.

2. The Bolting Integrity (B.2.1.11) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination.

3. Component material is fiber-reinforced plastic. Fiber-reinforced plastic, corresponding to the NUREG-1801 material of PVC, has no aging effects in Air - Outdoor (External), consistent with NUREG-1801 item VIII.I.SP-152 for PVC material in an Air - indoor, uncontrolled environment. Fiber-reinforced plastic, corresponding to PVC, also has no aging effects in the Raw Water environment, consistent with NUREG-1801 item VIII.I.SP-153 for PVC in the Condensation environment.

Table 3.4.2-2
Condensate System
Summary of Aging Management Evaluation

Table 3.4.2-2 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
Expansion Joints	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.E.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-73	3.4.1-14	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.2.1.22)	VIII.E.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-87	3.4.1-16	A
Flow Device	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.E.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-73	3.4.1-14	A
		Glass	Air - Indoor, Uncontrolled (External)	None	None	VIII.I.SP-9	3.4.1-55	A
			Treated Water (Internal)	None	None	VIII.I.SP-35	3.4.1-55	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.2.1.25)	VIII.H.S-29	3.4.1-34	A

Table 3.4.2-2 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	Leakage Boundary	Carbon Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.E.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-73	3.4.1-14	A
				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.2.1.22)	VIII.E.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-87	3.4.1-16	A
	Pressure Boundary	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.2.1.22)	VIII.E.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-87	3.4.1-16	A
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.E.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-73	3.4.1-14	A
				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.2.1.22)	VIII.E.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-87	3.4.1-16	A
	Pressure Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VIII.I.SP-12	3.4.1-58	A

Table 3.4.2-2 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	Pressure Boundary	Stainless Steel	Air - Outdoor (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.E.SP-127	3.4.1-3	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.E.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-87	3.4.1-16	A

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 3.4.2-3
Condenser and Air Removal System
Summary of Aging Management Evaluation

Table 3.4.2-3 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
			Treated Water (External)	Loss of Material	Bolting Integrity (B.2.1.11)	V.D2.EP-60	3.2.1-16	E, 1, 3
				Loss of Preload	Bolting Integrity (B.2.1.11)	V.E.EP-122	3.2.1-15	A, 1
Flow Device	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.E.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-73	3.4.1-14	A
		Glass	Air - Indoor, Uncontrolled (External)	None	None	VIII.I.SP-9	3.4.1-55	A
			Treated Water (Internal)	None	None	VIII.I.SP-35	3.4.1-55	A
Heat Exchanger Components	Containment, Holdup and Plateout	Aluminum	Air - Indoor, Uncontrolled (External)	None	None	VIII.I.SP-93	3.4.1-52	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.D2.SP-90	3.4.1-16	C
					Water Chemistry (B.2.1.2)	VIII.D2.SP-90	3.4.1-16	C
		Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.E.SP-77	3.4.1-15	A

Table 3.4.2-3 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
Heat Exchanger Components	Containment, Holdup and Plateout	Carbon Steel	Treated Water (Internal)	Loss of Material	Water Chemistry (B.2.1.2)	VIII.E.SP-77	3.4.1-15	A
		Copper	Air - Indoor, Uncontrolled (External)	None	None	VIII.I.SP-6	3.4.1-54	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.A.SP-101	3.4.1-16	C
					Water Chemistry (B.2.1.2)	VIII.A.SP-101	3.4.1-16	C
	Leakage Boundary	Aluminum	Air - Indoor, Uncontrolled (External)	None	None	VIII.I.SP-93	3.4.1-52	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.D2.SP-90	3.4.1-16	C
					Water Chemistry (B.2.1.2)	VIII.E.SP-90	3.4.1-16	C
		Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)			H, 2
					One-Time Inspection (B.2.1.22)	VIII.E.SP-77	3.4.1-15	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-77	3.4.1-15	A
		Copper	Air - Indoor, Uncontrolled (External)	None	None	VIII.I.SP-6	3.4.1-54	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.A.SP-101	3.4.1-16	C
					Water Chemistry (B.2.1.2)	VIII.A.SP-101	3.4.1-16	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.2.1.25)	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, 4

Table 3.4.2-3 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	Leakage Boundary	Carbon Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.E.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-73	3.4.1-14	A
				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 > 140°F (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VIII.C.SP-88	3.4.1-11	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-88	3.4.1-11	A
				Loss of Material	One-Time Inspection (B.2.1.22)	VIII.E.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-87	3.4.1-16	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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, 4
				Loss of Material	One-Time Inspection (B.2.1.22)	VIII.E.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-73	3.4.1-14	A
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.E.S-16	3.4.1-5	A
Tanks	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.E.SP-75	3.4.1-12	A

Table 3.4.2-3 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
Tanks	Leakage Boundary	Carbon Steel	Treated Water (Internal)	Loss of Material	Water Chemistry (B.2.1.2)	VIII.E.SP-75	3.4.1-12	A
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.E.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-73	3.4.1-14	A
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.E.S-16	3.4.1-5	A

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 main condenser expansion joint steam space bolting. The aging effects for steel bolting in a treated water environment include loss of material and loss of preload. These aging effects are managed by the Bolting Integrity (B.2.1.11) program.

2. The aging effect for the main condenser internal structural steel in a treated water environment is loss of material. This aging effect is managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.16) program.

3. The Bolting Integrity (B.2.1.11) program is substituted to manage the aging effect 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 3.4.2-4
Extraction Steam System
Summary of Aging Management Evaluation

Table 3.4.2-4 Extraction 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
Expansion Joints	Leakage Boundary	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.2.1.22)	VIII.C.SP-88	3.4.1-11	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-88	3.4.1-11	A
				Loss of Material	One-Time Inspection (B.2.1.22)	VIII.C.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-87	3.4.1-16	A
Flow Device	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.C.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-73	3.4.1-14	A
		Glass	Air - Indoor, Uncontrolled (External)	None	None	VIII.I.SP-9	3.4.1-55	A
			Treated Water (Internal)	None	None	VIII.I.SP-35	3.4.1-55	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.2.1.25)	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

Table 3.4.2-4 Extraction 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	Leakage Boundary	Carbon Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.C.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-73	3.4.1-14	A
				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 > 140°F (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VIII.C.SP-88	3.4.1-11	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-88	3.4.1-11	A
				Loss of Material	One-Time Inspection (B.2.1.22)	VIII.C.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-87	3.4.1-16	A
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.C.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-73	3.4.1-14	A
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.E.S-16	3.4.1-5	A

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
Feedwater System
Summary of Aging Management Evaluation

Table 3.4.2-5 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
Expansion Joints	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.D2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.D2.SP-73	3.4.1-14	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.2.1.22)	VIII.D1.SP-88	3.4.1-11	A
					Water Chemistry (B.2.1.2)	VIII.D1.SP-88	3.4.1-11	A
				Loss of Material	One-Time Inspection (B.2.1.22)	VIII.D2.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.D2.SP-87	3.4.1-16	A
Flow Device	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.D2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.D2.SP-73	3.4.1-14	A
		Glass	Air - Indoor, Uncontrolled (External)	None	None	VIII.I.SP-9	3.4.1-55	A

Table 3.4.2-5 Feedwater System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Flow Device	Leakage Boundary	Glass	Treated Water (Internal)	None	None	VIII.I.SP-35	3.4.1-55	A
Heat Exchanger Components (Drain Cooler Shell and Tube Side Components)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.D2.SP-73	3.4.1-14	C
					Water Chemistry (B.2.1.2)	VIII.D2.SP-73	3.4.1-14	C
Heat Exchanger Components (Feedwater Heater Shell and Tube Side Components)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.D2.SP-73	3.4.1-14	C
					Water Chemistry (B.2.1.2)	VIII.D2.SP-73	3.4.1-14	C
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.D2.S-16	3.4.1-5	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.2.1.25)	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.2.1.22)	VIII.D2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.D2.SP-73	3.4.1-14	A
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.D2.S-16	3.4.1-5	A
		Glass	Air - Indoor, Uncontrolled (External)	None	None	VIII.I.SP-9	3.4.1-55	A
			Treated Water (Internal)	None	None	VIII.I.SP-35	3.4.1-55	A

Table 3.4.2-5 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	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.2.1.22)	VIII.D2.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.D2.SP-87	3.4.1-16	A
			Treated Water > 140°F (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VIII.D1.SP-88	3.4.1-11	A
					Water Chemistry (B.2.1.2)	VIII.D1.SP-88	3.4.1-11	A
				Loss of Material	One-Time Inspection (B.2.1.22)	VIII.D2.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.D2.SP-87	3.4.1-16	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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.2.1.22)	VIII.D2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.D2.SP-73	3.4.1-14	A
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.D2.S-16	3.4.1-5	A
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	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.2.1.22)	VIII.D2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.D2.SP-73	3.4.1-14	A
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.D2.S-16	3.4.1-5	A

Table 3.4.2-5 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	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.D2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.D2.SP-73	3.4.1-14	A
				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.2.1.22)	VIII.D2.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.D2.SP-87	3.4.1-16	A
			Treated Water > 140°F (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VIII.D1.SP-88	3.4.1-11	A
					Water Chemistry (B.2.1.2)	VIII.D1.SP-88	3.4.1-11	A
				Loss of Material	One-Time Inspection (B.2.1.22)	VIII.D2.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.D2.SP-87	3.4.1-16	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.D2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.D2.SP-73	3.4.1-14	A
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.D2.S-16	3.4.1-5	A

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 the component is evaluatd in Section 4.3.

Table 3.4.2-6
Main Steam System
Summary of Aging Management Evaluation

Table 3.4.2-6 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
Flow Device	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.B2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-73	3.4.1-14	A
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.D2.S-16	3.4.1-5	A
		Glass	Air - Indoor, Uncontrolled (External)	None	None	VIII.I.SP-9	3.4.1-55	A
			Treated Water (Internal)	None	None	VIII.I.SP-35	3.4.1-55	A
Heat Exchanger Components	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.E.SP-77	3.4.1-15	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-77	3.4.1-15	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.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Steam (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.B2.SP-160	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-160	3.4.1-14	A

Table 3.4.2-6 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	Leakage Boundary	Carbon Steel	Steam (Internal)	Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.B2.S-15	3.4.1-5	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.B2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-73	3.4.1-14	A
				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.2.1.22)	VIII.C.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-87	3.4.1-16	A
			Treated Water > 140°F (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VIII.C.SP-88	3.4.1-11	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-88	3.4.1-11	A
				Loss of Material	One-Time Inspection (B.2.1.22)	VIII.C.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-87	3.4.1-16	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	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.2.1.22)	VIII.B2.SP-160	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-160	3.4.1-14	A

Table 3.4.2-6 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	Steam (Internal)	Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.B2.S-15	3.4.1-5	A
			Treated Water (External)	Cumulative Fatigue Damage	TLAA	VIII.B2.S-08	3.4.1-1	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	VIII.B2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-73	3.4.1-14	A
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.D2.S-16	3.4.1-5	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.2.1.22)	VIII.B2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-73	3.4.1-14	A
				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 (External)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.C.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-87	3.4.1-16	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.C.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-87	3.4.1-16	A
			Treated Water > 140°F (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VIII.C.SP-88	3.4.1-11	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-88	3.4.1-11	A
				Loss of Material	One-Time Inspection (B.2.1.22)	VIII.C.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-87	3.4.1-16	A

Table 3.4.2-6 Main Steam 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.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Steam (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.B2.SP-160	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-160	3.4.1-14	A
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.B2.S-15	3.4.1-5	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.B2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-73	3.4.1-14	A
				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.2.1.22)	VIII.C.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-87	3.4.1-16	A
			Treated Water > 140°F (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VIII.C.SP-88	3.4.1-11	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-88	3.4.1-11	A
				Loss of Material	One-Time Inspection (B.2.1.22)	VIII.C.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-87	3.4.1-16	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Steam (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.B2.SP-160	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-160	3.4.1-14	A
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.B2.S-15	3.4.1-5	A

Table 3.4.2-6 Main Steam 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)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.B2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-73	3.4.1-14	A
				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
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VIII.B2.SP-110	3.4.1-39	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.C.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-87	3.4.1-16	A

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 3.4.2-7
Main Turbine
Summary of Aging Management Evaluation

Table 3.4.2-7 Main Turbine

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.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Air/Gas - Dry (Internal)	None	None	VIII.I.SP-4	3.4.1-59	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VIII.A.SP-91	3.4.1-40	A
					One-Time Inspection (B.2.1.22)	VIII.A.SP-91	3.4.1-40	A
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
Flow Device	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.B2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-73	3.4.1-14	A
		Glass	Air - Indoor, Uncontrolled (External)	None	None	VIII.I.SP-9	3.4.1-55	A
			Treated Water (Internal)	None	None	VIII.I.SP-35	3.4.1-55	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.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VIII.A.SP-91	3.4.1-40	A

Table 3.4.2-7 Main Turbine (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	Lubricating Oil (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.A.SP-91	3.4.1-40	A
			Steam (Internal)	Cumulative Fatigue Damage	TLAA	VIII.B2.S-08	3.4.1-1	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	VIII.A.SP-71	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.A.SP-71	3.4.1-14	A
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.A.S-15	3.4.1-5	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.B2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-73	3.4.1-14	A
				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
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VIII.A.SP-95	3.4.1-44	A
					One-Time Inspection (B.2.1.22)	VIII.A.SP-95	3.4.1-44	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.C.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-87	3.4.1-16	A
			Treated Water > 140°F (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VIII.C.SP-88	3.4.1-11	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-88	3.4.1-11	A
				Loss of Material	One-Time Inspection (B.2.1.22)	VIII.C.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-87	3.4.1-16	A
Tanks (EHC drain tank)	Leakage Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VIII.I.SP-12	3.4.1-58	A

Table 3.4.2-7 Main Turbine (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Tanks (EHC drain tank)	Leakage Boundary	Stainless Steel	Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VIII.B2.SP-110	3.4.1-39	C
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VIII.A.SP-95	3.4.1-44	A
					One-Time Inspection (B.2.1.22)	VIII.A.SP-95	3.4.1-44	A
Tanks (Moisture Separators)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.B2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-73	3.4.1-14	A
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.E.S-16	3.4.1-5	A
Turbine Casings (High Pressure Casing)	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.B2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-73	3.4.1-14	A
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.E.S-16	3.4.1-5	A
Turbine Casings (Low Pressure Exhaust Hoods)	Containment, Holdup and Plateout	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.B2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-73	3.4.1-14	A
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.E.S-16	3.4.1-5	A

Table 3.4.2-7 Main Turbine (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.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VIII.A.SP-91	3.4.1-40	A
					One-Time Inspection (B.2.1.22)	VIII.A.SP-91	3.4.1-40	A
			Steam (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.A.SP-71	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.A.SP-71	3.4.1-14	A
				Wall Thinning	Flow-Accelerated Corrosion (B.2.1.10)	VIII.A.S-15	3.4.1-5	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.B2.SP-73	3.4.1-14	A
					Water Chemistry (B.2.1.2)	VIII.B2.SP-73	3.4.1-14	A
				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
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VIII.A.SP-95	3.4.1-44	A
					One-Time Inspection (B.2.1.22)	VIII.A.SP-95	3.4.1-44	A

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.

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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.

- 220 and 500 kV Substations (2.4.1)
- Admin Building Shop and Warehouse (2.4.2)
- Auxiliary Boiler and Lube Oil Storage Enclosure (2.4.3)
- Circulating Water Pump House (2.4.4)
- Component Supports Commodities Group (2.4.5)
- Control Enclosure (2.4.6)
- Cooling Towers (2.4.7)
- Diesel Oil Storage Tank Structures (2.4.8)
- Emergency Diesel Generator Enclosure (2.4.9)
- Piping and Component Insulation Commodity Group (2.4.10)
- Primary Containment (2.4.11)
- Radwaste Enclosure (2.4.12)
- Reactor Enclosure (2.4.13)
- Service Water Pipe Tunnel (2.4.14)
- Spray Pond and Pump House (2.4.15)
- Turbine Enclosure (2.4.16)
- Yard Facilities (2.4.17)

3.5.2 RESULTS

The following tables summarize the results of the aging management review for Structures and Component Supports.

Table 3.5.2-1 220 and 500 kV Substations Summary of Aging Management Evaluation

Table 3.5.2-2 Admin Building Shop and Warehouse Summary of Aging Management Evaluation

Table 3.5.2-3 Auxiliary Boiler and Lube Oil Storage Enclosure Summary of Aging Management Evaluation

3.5.2.1 Materials, Environments, Aging Effects Requiring Management And Aging Management Programs

3.5.2.1.1 220 and 500 kV Substations

Materials

The materials of construction for the 220 and 500 kV Substations components are:

- Aluminum
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Ductile Cast Iron
- Elastomer

- Galvanized Bolting
- Galvanized Steel
- Reinforced Concrete

Environments

The 220 and 500 kV Substations 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 220 and 500 kV Substations components require management:

- 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 220 and 500 kV Substations components:

- Structures Monitoring (B.2.1.35)

3.5.2.1.2 Admin Building Shop and Warehouse

Materials

The materials of construction for the Admin Building Shop and Warehouse components are:

- Aluminum
- Carbon Steel
- Carbon and Low Alloy Steel Bolting

- Concrete Block
- Elastomer
- Galvanized Bolting
- Galvanized Steel
- Glass
- Grout
- PVC
- Reinforced Concrete

Environments

The Admin Building Shop and Warehouse 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 Admin Building Shop and Warehouse components require management:

- Cracking
- Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)
- Increased Hardness, Shrinkage and Loss of Strength
- 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 Admin Building Shop and Warehouse components:

- Masonry Walls (B.2.1.34)

- Structures Monitoring (B.2.1.35)

3.5.2.1.3 Auxiliary Boiler and Lube Oil Storage Enclosure

Materials

The materials of construction for the Auxiliary Boiler and Lube Oil Storage Enclosure components are:

- Aluminum
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Concrete Block
- Elastomer
- Galvanized Bolting
- Galvanized Steel
- Glass
- Grout
- PVC
- Reinforced Concrete

Environments

The Auxiliary Boiler and Lube Oil Storage Enclosure 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 Auxiliary Boiler and Lube Oil Storage Enclosure 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

- Increased Hardness, Shrinkage and 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 Auxiliary Boiler and Lube Oil Storage Enclosure components:

- Masonry Walls (B.2.1.34)
- Structures Monitoring (B.2.1.35)

3.5.2.1.4 Circulating Water Pump House

Materials

The materials of construction for the Circulating Water Pump House components are:

- Aluminum
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Concrete Block
- Elastomer
- Galvanized Steel
- Grout
- Reinforced Concrete
- Stainless Steel

Environments

The Circulating Water Pump House 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 Circulating Water Pump House components require management:

- Cracking
- 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 Circulating Water Pump House components:

- Masonry Walls (B.2.1.34)
- Structures Monitoring (B.2.1.35)

3.5.2.1.5 Component Supports Commodities Group

Materials

The materials of construction for the Component Supports Commodities Group components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Concrete
- Elastomer
- Galvanized Bolting
- Galvanized Steel
- Grout
- Lubrite
- Reinforced Concrete
- Stainless Steel
- Stainless Steel Bolting

Environments

The Component Supports Commodities 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 Commodities Group components require management:

- Loss of Material
- Loss of Mechanical Function
- Loss of Preload
- Reduction in Anchor Capacity Due to Local Concrete Degradation
- Reduction or Loss of Isolation Function

Aging Management Programs

The following aging management programs manage the aging effects for the Component Supports Commodities Group components:

- ASME Section XI, Subsection IWF (B.2.1.32)
- Structures Monitoring (B.2.1.35)
- Water Chemistry (B.2.1.2)

3.5.2.1.6 Control Enclosure

Materials

The materials of construction for the Control Enclosure components are:

- Aluminum
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Concrete Block
- Elastomer
- Galvanized Bolting
- Galvanized Steel
- Grout
- Reinforced Concrete
- Stainless Steel
- Stainless Steel Bolting

Environments

The Control Enclosure components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air - Outdoor
- Concrete
- Groundwater/Soil
- Raw Water
- Water - Flowing

Aging Effects Requiring Management

The following aging effects associated with the Control Enclosure components require management:

- Cracking
- 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
- Increased Hardness, Shrinkage and 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 Control Enclosure components:

- Masonry Walls (B.2.1.34)
- Structures Monitoring (B.2.1.35)

3.5.2.1.7 Cooling Towers

Materials

The materials of construction for the Cooling Towers components are:

- Elastomer
- Reinforced Concrete

Environments

The Cooling Towers components are exposed to the following environments:

- Air - Outdoor
- Groundwater/Soil
- Raw Water
- Water - Flowing

Aging Effects Requiring Management

The following aging effects associated with the Cooling Towers components require management:

- 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 (Spalling, Scaling)
- Loss of Material (Spalling, Scaling) and Cracking
- Loss of Sealing

Aging Management Programs

The following aging management program manages the aging effects for the Cooling Towers components:

- Structures Monitoring (B.2.1.35)

3.5.2.1.8 Diesel Oil Storage Tank Structures

Materials

The materials of construction for the Diesel Oil Storage Tank Structures components are:

- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Ductile Cast Iron
- Elastomer
- Galvanized Bolting
- Galvanized Steel
- Grout
- Reinforced Concrete
- Stainless Steel

Environments

The Diesel Oil Storage Tank 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 Diesel Oil Storage Tank Structures components require management:

- 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 program manages the aging effects for the Diesel Oil Storage Tank Structures components:

- Structures Monitoring (B.2.1.35)

3.5.2.1.9 Emergency Diesel Generator Enclosure

Materials

The materials of construction for the Emergency Diesel Generator Enclosure components are:

- Aluminum
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Elastomer
- Galvanized Bolting
- Galvanized Steel
- Grout
- Reinforced Concrete
- Stainless Steel

Environments

The Emergency Diesel Generator Enclosure 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 Emergency Diesel Generator Enclosure components require management:

- 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
- Increased Hardness, Shrinkage and 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 program manages the aging effects for the Emergency Diesel Generator Enclosure components:

- Structures Monitoring (B.2.1.35)

3.5.2.1.10 Piping and Component Insulation Commodity Group

Materials

The materials of construction for the Piping and Component Insulation Commodity Group components are:

- Aluminum
- Calcium Silicate
- Carbon Steel
- Caulking and Lagging Adhesive
- Cellular Glass
- Ceramic Fiber

- Fiberglass
- Fiberglass (Molded)
- Fiberglass Cloth (includes silicone coated fiberglass cloth)
- Foamed Plastic (includes Rubatex)
- Galvanized Steel
- Insulation Cement and Finishing Cement
- Min-K
- Mineral Fiber
- NUKON
- Plastic Mastic Jacketing
- Stainless Steel
- Stainless Steel (Mirror Insulation)

Environments

The Piping and Component Insulation Commodity Group components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air - Outdoor

Aging Effect Requiring Management

The following aging effect associated with the Piping and Component Insulation Commodity Group components requires management:

- Loss of Material

Aging Management Programs

The following aging management program manages the aging effects for the Piping and Component Insulation Commodity Group components:

- Structures Monitoring (B.2.1.35)

3.5.2.1.11 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
- Galvanized Bolting
- Galvanized Steel
- Lead
- Reinforced Concrete
- Stainless Steel

Environments

The Primary Containment components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Concrete
- Encased In Steel
- Groundwater/Soil
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Primary Containment components require management:

- Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)
- Cumulative Fatigue Damage
- Fretting or Lock-up
- Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)
- Increased Hardness, Shrinkage and Loss of Strength
- Loss of Coating Integrity
- Loss of Leaktightness
- Loss of Material
- Loss of Preload
- 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.2.1.33)
- ASME Section XI, Subsection IWE (B.2.1.30)
- ASME Section XI, Subsection IWF (B.2.1.32)
- ASME Section XI, Subsection IWL (B.2.1.31)
- Protective Coating Monitoring and Maintenance Program (B.2.1.37)
- Structures Monitoring (B.2.1.35)
- TLAA
- Water Chemistry (B.2.1.2)

3.5.2.1.12 Radwaste Enclosure

Materials

The materials of construction for the Radwaste Enclosure components are:

- Aluminum
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Concrete Block
- Elastomer
- Galvanized Bolting
- Galvanized Steel
- Grout
- Lead
- Reinforced Concrete
- Stainless Steel

Environments

The Radwaste Enclosure components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air - Outdoor
- Concrete
- Groundwater/Soil
- Raw Water
- Water - Flowing

Aging Effects Requiring Management

The following aging effects associated with the Radwaste Enclosure components require management:

- Cracking
- 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
- Increased Hardness, Shrinkage and 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 Radwaste Enclosure components:

- Masonry Walls (B.2.1.34)
- Structures Monitoring (B.2.1.35)

3.5.2.1.13 Reactor Enclosure

Materials

The materials of construction for the Reactor Enclosure components are:

- Aluminum
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Concrete Block
- Elastomer
- Galvanized Bolting
- Galvanized Steel
- Grout
- Reinforced Concrete
- Stainless Steel
- Stainless Steel Bolting

Environments

The Reactor Enclosure components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air - Outdoor
- Concrete
- Groundwater/Soil
- Raw Water
- Treated Water
- Water - Flowing

Aging Effects Requiring Management

The following aging effects associated with the Reactor Enclosure components require management:

- Cracking
- Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)
- Hardening and Loss of Strength
- Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)
- Increase in Porosity and Permeability, Loss of Strength
- Increased Hardness, Shrinkage and Loss of Strength
- Loss of Material
- 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 Enclosure components:

- Masonry Walls (B.2.1.34)
- Structures Monitoring (B.2.1.35)
- Water Chemistry (B.2.1.2)

3.5.2.1.14 Service Water Pipe Tunnel

Materials

The materials of construction for the Service Water Pipe Tunnel components are:

- Aluminum
- Carbon Steel
- Carbon and Low Alloy Steel Bolting

- Elastomer
- Galvanized Bolting
- Galvanized Steel
- Grout
- Reinforced Concrete

Environments

The Service Water Pipe Tunnel 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 Service Water Pipe Tunnel components require management:

- 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
- Increased Hardness, Shrinkage and 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 program manages the aging effects for the Service Water Pipe Tunnel components:

- Structures Monitoring (B.2.1.35)

3.5.2.1.15 Spray Pond and Pump House

Materials

The materials of construction for the Spray Pond and Pump House components are:

- Aluminum
- Carbon Steel

- Carbon and Low Alloy Steel Bolting
- Ductile Cast Iron
- Elastomer
- Galvanized Bolting
- Galvanized Steel
- Grout
- Reinforced Concrete
- Soil, rip-rap, sand, gravel
- Stainless Steel
- Stainless Steel Bolting

Environments

The Spray Pond and Pump 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 Spray Pond and Pump House components require management:

- Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)
- Increase in Porosity and Permeability, Loss of Strength
- Increased Hardness, Shrinkage and Loss of Strength
- Loss of Material
- Loss of Material (Spalling, Scaling) and Cracking
- Loss of Material, Loss of Form
- Loss of Preload
- Loss of Sealing

Aging Management Programs

The following aging management programs manage the aging effects for the Spray Pond and Pump House components:

- RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)
- Structures Monitoring (B.2.1.35)

3.5.2.1.16 Turbine Enclosure

Materials

The materials of construction for the Turbine Enclosure components are:

- Aluminum
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Concrete Block
- Elastomer
- Galvanized Steel
- Glass
- Grout
- Lubrite
- PVC
- Reinforced Concrete
- Stainless Steel

Environments

The Turbine Enclosure components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air - Outdoor
- Concrete
- Groundwater/Soil
- Raw Water
- Water - Flowing

Aging Effects Requiring Management

The following aging effects associated with the Turbine Enclosure components require management:

- Cracking
- 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
- Increased Hardness, Shrinkage and Loss of Strength
- Loss of Material
- Loss of Material (Spalling, Scaling) and Cracking
- Loss of Mechanical Function
- Loss of Preload
- Loss of Sealing

Aging Management Programs

The following aging management programs manage the aging effects for the Turbine Enclosure components:

- Masonry Walls (B.2.1.34)
- Structures Monitoring (B.2.1.35)

3.5.2.1.17 Yard Facilities

Materials

The materials of construction for the Yard Facilities components are:

- Aluminum
- Carbon Steel
- Carbon and Low Alloy Steel Bolting
- Concrete
- Concrete Block
- Ductile Cast Iron
- Elastomer
- Galvanized Bolting
- Galvanized Steel
- Grout
- Reinforced Concrete
- Soil

Environments

The Yard Facilities 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 Yard Facilities 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
- Increased Hardness, Shrinkage and Loss of Strength
- Loss of Material
- Loss of Material (Spalling, Scaling) and Cracking
- Loss of Material or Loss of Form
- Loss of Preload
- Loss of Sealing

Aging Management Programs

The following aging management programs manage the aging effects for the Yard Facilities components:

- Masonry Walls (B.2.1.34)
- RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)
- Structures Monitoring (B.2.1.35)

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 LRA. For the Containments, 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 not applicable to the LGS Mark II concrete containment. Item Number 3.5.1-2 is not applicable to the LGS Mark II concrete containment. LGS does not utilize porous concrete subfoundation material and does not rely on a de-watering system to control settlement. The LGS Primary Containments are founded on bedrock and therefore this aging effect and mechanism is not applicable to the Primary Containment structures. 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 LGS Mark II concrete containment. The LGS Primary Containment bulk average bulk temperature does not exceed 145 degrees F. In addition, localized concrete temperatures exceeding 200 degrees F have not been reported. The bulk air temperature is maintained within Technical Specification limits by recirculation of air through the Primary Containment Ventilation System.

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).*

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).*

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).*

1. Item Number 3.5.1-4 is not applicable to the LGS Mark II concrete containment. However, Item Number 3.5.1-5 is applicable to LGS. The ASME Section XI, Subsection IWE (B.2.1.30) program and the 10 CFR Part 50, Appendix J (B.2.1.33) program will be used to manage the loss of material of steel elements in both the accessible and the inaccessible areas of the drywell and suppression pool liner, liner anchors, integral attachments, drywell head, embedded shell, including the region shielded by diaphragm floor. The LGS 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 LGS IWE surfaces are accessible for inspection. The coated liner surfaces are inspected for coating defects such as blisters that could indicate a corrosion of the carbon steel liner. There are limited areas that are inaccessible for inspection which include the thickened embedded steel structural weldment covered by the outer edges of the steel lined concrete diaphragm slab (drywell floor), and also the suppression pool floor liner areas covered by the suppression pool columns and areas behind the suction strainers. The diaphragm slab concrete floor is lined with steel which is welded to the containment wall liner and the suppression pool concrete floor is lined with steel which is welded to the suppression pool wall liner such that there are no concrete to steel interface surfaces which would require a moisture barrier seal. PWR and Mark I

containments have experienced degradation of such moisture barriers which could result in corrosion of inaccessible IWE liner surfaces under the concrete. Such conditions are precluded by the LGS Mark II concrete containment design configuration. In addition, the LGS 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 LGS 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 general corrosion and pitting has been identified by IWE examinations; it is primarily in the underwater portions of the suppression pool and it has not been significant. In addition, as described in the ASME Section XI, Subsection IWE aging management program Appendix B of this License Renewal Application, the program will be enhanced prior to the period of extended operation to address the conditions identified.

2. Item Number 3.5.1-6 is not applicable to the LGS Mark II concrete containment. This discussion paragraph is applicable to Mark I containments and the associated torus. It is not applicable to the LGS Mark II concrete containment design which utilizes a suppression pool.

3. Item Number 3.5.1-7 is not applicable to the LGS Mark II concrete containment. This Item is applicable instead to Mark I and Mark III steel containments. The ASME Section XI, Subsection IWE (B.2.1.30) program will be used to manage the loss of material of the LGS Mark II steel diaphragm floor liner, downcomers, and vacuum relief valve piping and valves as addressed by Item Number 3.5.1-31.

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 not applicable to the LGS Mark II concrete containment design which does not incorporate the use of tendons. The LGS concrete Primary Containment design utilizes conventional reinforcing steel bars.

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.*

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 fatigue as a TLAA for the LGS Primary Containment liner and penetration sleeves, refueling bellows, and downcomers is addressed separately in sections 4.5, 4.6.7 and 4.6.8.

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 LGS penetration sleeves and penetration bellows. The LGS Primary Containment design does not utilize penetration bellows. This Item is also not applicable to the LGS penetration sleeves which are carbon steel. While dissimilar welds and stainless steel CRD lines associated with penetrations exist; they are exposed to air-indoor and are not exposed to a corrosive environment. All the parameters necessary for SCC to occur are not present. LGS and industry OE has not identified cracking due to SCC as an applicable aging effect for dissimilar metal welds on Mark II containment penetration sleeves and CRD lines in a BWR indoor-air environment. 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 LGS Primary Containments. The LGS Primary Containments are completely enclosed, sheltered and protected within the air-indoor environment of the Reactor Enclosures (secondary containment). The LGS Primary Containment concrete is not subject to freezing temperature conditions in the Reactor Enclosure 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 does not apply to LGS 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 C295, ASTM C289, and other ASTM standards tests demonstrating that reactive aggregates were not used. In addition concrete structures were constructed in accordance with ACI 318 per UFSAR 3.8.6. IWL concrete examinations have not identified cracking due to expansion from reaction with aggregates. No further evaluation is required for this aging effect.

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 and Item Number 3.5.1.14 are not applicable to the LGS Primary Containments. LGS has not had any indication of leakage through the primary containment concrete, wall or basemat of the Mark II containment. The primary containment is completely enclosed and sheltered located within the air-indoor environment of the Reactor Enclosure (secondary containment) and the interior of the primary containment is lined with steel. There is no flowing water through concrete that could be associated with this aging effect. No leaching has been observed in accessible areas of the Primary Containment that could have an impact on intended function. A further evaluation of this aging effect is not 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.

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.*

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.*

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.*

1. The Structures Monitoring (B.2.1.35) program will be used to manage loss of material (spalling, scaling) and cracking in both accessible and inaccessible areas. At LGS 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 LGS structures. However, these concrete structures are designed and constructed in accordance with ACI 318-71 and ACI 301-66 as described in the UFSAR. The design provides for low permeability and adequate air entrainment (3 percent to 7 percent) such that the concrete has good freeze-thaw resistance. Operating experience has not identified significant of loss of material (spalling, scaling) and cracking due freeze-thaw for in-scope reinforced concrete structures. Although operating experience has not identifed significant loss of material and cracking due to freeze thaw, the Structures Monitoring program does include inspection for this aging effect 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 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, LGS will examine exposed portions of the below-grade concrete, when excavated for any reason in accordance with the Structures Monitoring program.

2. Item Number 3.5.1-43 is not applicable to LGS. This aging effect and mechanism combination does not apply to LGS concrete structures. Fine and course aggregates conform to ASTM C33. Petrographic examinations of aggregates were performed in accordance with ASTM C295, ASTM C289, and other ASTM tests demonstrating that reactive aggregates were not used. Thus, cracking due to expansion and reaction with aggregate is not applicable and requires no aging management. 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 LGS concrete structures. Nevertheless, the Structures Monitoring (B.2.1.35) program continues to inspect and monitor concrete structures for cracking due to any mechanism. LGS will also examine exposed portions of the below-grade concrete, when excavated for any reason in accordance with the Structures Monitoring program. The LGS structural concrete was constructed as recommended to preclude cracking due to this mechanism; therefore no aging management or further evaluation of inaccessible below grade concrete for this mechanism is required.

3. Item Numbers 3.5.1-45 and 3.5.1-46 are not applicable to LGS. LGS 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 LGS structures which are not founded on rock. All seismic Category I plant facilities are founded on bedrock, except part of the spray pond, portions of the underground piping, and electrical ducts, diesel oil tanks, and valve pits, which are founded on weathered rock, natural soil or fills. Other non safety-related in scope structures are founded on bedrock, natural soil or structural fill. This aging effect and mechanism combination does apply to those LGS concrete structures founded on natural soil or structural fill. Cracking and distortion due to settlement has not been observed in LGS concrete structures and the potential for settlement and distortion is considered insignificant for LGS structures. Nevertheless, the Structures Monitoring (B.2.1.35) program continues to inspect and monitor concrete structures for cracking due to any mechanism. The condition of accessible and above grade concrete are 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, LGS 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. No further evaluation of this aging effect and mechanism is required as LGS 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. The Structures Monitoring (B.2.1.35) 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. The effects of

carbonation have not been observed on LGS concrete. Operating experience at LGS has found that increase in porosity and permeability and loss of strength due to these mechanisms is not significant and is therefore adequately managed by the Structures Monitoring (B.2.1.35) program. LGS reinforced concrete is designed and constructed to meet ACI and ASTM Specifications including ACI 318 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, LGS 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 LGS. Group 1 and 3 structures are not subject to a general area temperatures greater than 150 degrees F. In addition local temperatures in excess of 200 degrees F have not been reported at LGS. The Technical Specification and UFSAR limit the bulk average temperature to 145 degrees F 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 Enclosure which is a Group 1 structure. The spent fuel pool water temperature is maintained below 140 degrees F under normal plant operating conditions.

Group 1, 3, and 4 concrete structural components are not subject to local temperature greater than 200 degrees F. Process piping operating at temperatures greater than 200 degrees F is insulated through penetrations. The insulation in combination with compartment air circulation reduces concrete local temperature to less than 200 degrees F. 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.*

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).*

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).*

1. The Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36) aging management program will be used to manage loss of material (spalling, scaling) and cracking in both accessible and inaccessible areas. LGS 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 LGS concrete structures. However, these concrete structures are designed and constructed in accordance with ACI 318-71 and ACI 301-66 as described in the UFSAR. The design provides for low permeability and adequate air entrainment (3 percent to 7 percent) such that the concrete has good freeze-thaw resistance. Operating experience review of structural concrete for in-scope structures has not identified significant of loss of material (spalling, scaling) and cracking due freeze-thaw of in scope reinforced concrete structures. Although significant loss of material and cracking due to freeze-thaw have not been documented in operating experience for Group 6 and other in scope structures, inspection for this aging effect is performed in by the Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36) aging management program. 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, LGS examines exposed portions of the below-grade concrete, when excavated for any reason in accordance with the Structures Monitoring (B.2.1.35) program.

2. Item Number 3.5.1-50 is not applicable to LGS concrete structures as the concrete was constructed as recommended to preclude this aging effect and mechanism. This aging effect/mechanism combination does not apply to LGS Group 6 concrete structures. Fine and course aggregates conform to ASTM C33. Petrographic examinations of aggregates were performed in accordance with ASTM C295, ASTM C289, and other ASTM tests demonstrating that reactive aggregates were not used. Thus, cracking due to expansion and reaction with aggregate is not applicable and requires no aging management. In addition, concrete structures were constructed in accordance with ACI 318. Plant operating experience has not found cracking associated with expansion due to reaction with aggregates on LGS Group 6 concrete structures. The Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36) aging management program continues to inspect and monitor Group 6 concrete structures for cracking due to any mechanism. The LGS structural concrete was constructed as recommended to preclude cracking due to this mechanism; therefore no aging management or further evaluation of inaccessible below grade Group 6 concrete structures for this mechanism is required.

3. The Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36), aging management program will be used to manage increase in porosity and permeability; loss of strength for Group 6 concrete for accessible and inaccessible above and below grade and foundation concrete. 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 Spray Pond and Spray Pond Pumphouse has not resulted in significant leaching. The effects of carbonation have not been observed on LGS concrete. Operating experience at LGS 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.2.1.36), aging management program. LGS reinforced concrete is designed and constructed to meet ACI and ASTM Specifications including ACI 318 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 Group 6 structures. LGS will examine exposed portions of the below-grade concrete, when excavated for any reason in accordance with the Structures Monitoring (B.2.1.35) 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. LGS does not have Group 7 and 8 structures

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 LGS. The LGS 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.

3.5.2.3 <u>Time-Limited Aging Analysis</u>

The time-limited aging analyses identified below are associated with Structures and Component Supports.

- Section 4.5, Containment Liner and Penetrations Fatigue Analysis
- Section 4.6, Other Plant-Specific Time-Limited Aging Analyses
    - Section 4.6.7, Refueling Bellows and Supports Cyclic Loading Analysis
    - Section 4.6.8, Downcomers and MSRV Discharge Piping Fatigue Analyses

3.5.3 CONCLUSION

The Primary Containment, Structures, Component Supports, and Piping and Component Insulation 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 Primary Containment, Structures, Component Supports, and Piping and Component Insulation components are identified in the summaries in Section 3.5.2.1 above.

A description of the 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 Primary Containment, Structures, Component Supports, and Piping and Component Insulation 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 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 (See subsection 3.5.2.2.1.1)	Not applicable. LGS does not rely on a de-watering system to control settlement. The LGS Primary Containments are founded on bedrock and therefore this aging effect and mechanism are not applicable to the Primary Containment structures. 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 (See subsection 3.5.2.2.1.1)	Not applicable. LGS does not utilize porous concrete subfoundation material or rely on a de-watering system to control settlement. The LGS Primary Containments are founded on bedrock and therefore this aging effect and mechanism are not applicable to the Primary Containment structures. See subsection 3.5.2.2.1.1

Table 3.5.1 Summary of Aging Management Evaluations for 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 (See subsection 3.5.2.2.1.2)	Not Applicable. It is not applicable to LGS whose bulk average temperature does not exceed 145 ° F. In addition, localized concrete temperature exceeding 200 ° F have not been reported. The bulk air temperature is maintained within Technical Specification limits by recirculation of air through the Primary Containment Ventilation System. 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 (See subsection 3.5.2.2.1.3.1)	Not Applicable. This Item Number is associated with Mark III steel containments. LGS is a Mark II concrete containment design. The loss of material for comparable LGS 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 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 (See subsection 3.5.2.2.1.3.1)	Consistent with NUREG-1801. The ASME Section XI, Subsection IWE (B.2.1.30) program and the 10 CFR Part 50, Appendix J (B.2.1.33) program will be used to manage the loss of material of 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). While some corrosion has been identified by IWE examinations; it is not significant. 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. (See subsection 3.5.2.2.1.3.2)	Not Applicable. This Item Number is applicable to Mark I steel containments. LGS design employs the drywell/pressure suppression features of the BWR Mark II concrete containment concept. The primary containment is a steel-lined reinforced concrete pressure-suppression system of the over-and-under configuration. See subsection 3.5.2.2.1.3.2.

Table 3.5.1 Summary of Aging Management Evaluations for 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 (See subsection 3.5.2.2.1.3.3)	Not Applicable. The LGS design employs the drywell/pressure suppression features of the BWR Mark II containment concept. The primary containment is a steel-lined reinforced concrete pressure-suppression system of the over-and-under 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 (See subsection 3.5.2.2.1.4)	Not Applicable. LGS design does not incorporate the use of tendons in its containment design. The LGS concrete Primary Containment design utilizes conventional reinforcing steel bars. 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 to fatigue (Only if CLB fatigue analysis exists)	Yes, TLAA	Yes, TLAA (See subsection 3.5.2.2.1.5)	Fatigue is a TLAA; further evaluation is documented in Subsection 3.5.2.2.1.5.

Table 3.5.1 Summary of Aging Management Evaluations for 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 (See subsection 3.5.2.2.1.6)	Not Applicable. The LGS design does not utilize penetration bellows. This Item is also not applicable to the LGS penetration sleeves which are carbon steel. While dissimilar welds and stainless steel CRD lines associated with penetrations exist; they are in air-indoor and are not exposed to a corrosive environment. All the parameters necessary for SCC to occur are not present. LGS and industry OE has not identified cracking due to SCC as an applicable aging effect for dissimilar metal welds and CRD line in an indoor-air environment. 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 (See subsection 3.5.2.2.1.7)	Not Applicable. LGS has not exhibited the aging effect/mechanism observed in inaccessible areas. The primary containment is completely enclosed and sheltered within the air-indoor environment of the Reactor Enclosure (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 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 (See subsection 3.5.2.2.1.8)	Not Applicable. The aging effect/mechanism does not apply to LGS concrete structures. Fine and course aggregates conform to ASTM C33. Petrographic examinations of aggregates were performed in accordance with ASTM C295, ASTM C289, and other ASTM tests demonstrating that reactive aggregates were not used. In addition, concrete structures were constructed in accordance with ACI 318 per UFSAR 3.8.6. See Subsection 3.5.2.2.1.8.

Table 3.5.1 Summary of Aging Management Evaluations for 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 (See subsection 3.5.2.2.1.9)	Not Applicable. The aging effect/mechanism does not apply to the LGS Primary Containment structures. LGS is a BWR Mark II concrete containment. This Item Number is not associated with the BWR Mark II Concrete Containment structure type. Inspections of LGS 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 Enclosure (secondary containment) and the interior of the primary containment is lined with steel. There is no flowing water through concrete that could be associated with this aging effect. See Subsection 3.5.2.2.1.9.

Table 3.5.1 Summary of Aging Management Evaluations for Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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 (See subsection 3.5.2.2.1.9)	Not Applicable. LGS has not had any indication of leakage through the primary containment concrete, wall or basemat of the Mark II containment. The primary containment is completely enclosed and sheltered located within the air-indoor environment of the Reactor Enclosure (secondary containment) and the interior of the primary containment is lined with steel. There is no flowing water through concrete that could be associated with this aging effect. 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 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. LGS is a BWR Mark II concrete containment. This Item Number is not associated with the BWR Mark II Concrete Containment structure type. Inspections of LGS structures have not identified any observed leaching observed in 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 Enclosure (secondary containment) and the interior of the primary containment is lined with steel. There is no flowing water through concrete that could be associated with this aging effect.

Table 3.5.1 Summary of Aging Management Evaluations for Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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. LGS 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 LGS Primary Containments, which are completely enclosed by the Reactor Enclosures.
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. LGS 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 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. LGS does not have any primary containment concrete areas subject to the air-outdoor environment.

Table 3.5.1 Summary of Aging Management Evaluations for Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Not Applicable. The component, material, environment, and aging effect/mechanism combination does not apply to LGS Primary Containment concrete. Fine and course aggregates conform to ASTM C33. Petrographic examinations of aggregates were performed in accordance with ASTM C295, ASTM C289, and other ASTM tests demonstrating that reactive aggregates were not used. In addition concrete structures were constructed in accordance with ACI 318 per UFSAR 3.8.6. Cracking associated with expansion due to reaction with aggregates has not been observed on accessible portions of the LGS Primary Containment which additionally is completely enclosed and sheltered by the Reactor Enclosures.

Table 3.5.1 Summary of Aging Management Evaluations for 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	Not Applicable. The component, material, environment, and aging effect/mechanism combination does not apply to LGS Primary Containment concrete. Inspections of LGS structures have not identified leaching in accessible primary containment areas. The primary containment is completely enclosed and sheltered located within the air-indoor environment of the Reactor Enclosure (secondary containment) and the interior of the primary containment is lined with steel. There is no flowing water through concrete that could be associated with this aging effect.
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.2.1.31) program will be used to manage cracking, loss of bond, and loss of material (spalling, scaling) for concrete containment surfaces (accessible areas), including the wall, basemat, with embedded reinforcing steel.

Table 3.5.1 Summary of Aging Management Evaluations for 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.2.1.35) program will be used to manage cracking, loss of bond and loss of material (spalling, scaling) for concrete (inaccessible areas) of the basemat and reinforcing steel.
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 LGS Primary Containment concrete are addressed in 3.5.1-22.
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 pereability; 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.2.1.35) program will be used to manage increase in porosity and permeability; cracking; loss of material (spalling, scaling) in inaccessible areas. In addition, the LGS Primary Containments are completely enclosed and sheltered by the Reactor Enclosures and the Primary Containment basemat is not in contact with groundwater and soil as it is placed directly on rock.
3.5.1-25	PWRs only				

Table 3.5.1 Summary of Aging Management Evaluations for Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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 LGS Primary Containment design does not contain a caulked or sealed moisture barrier. There is no concrete to steel interface requiring a moisture barrier in the LGS Mark II concrete containment design.
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. LGS 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 ASME Section XI, Subsection IWE (B.2.1.30) program and the 10 CFR Part 50, Appendix J (B.2.1.33) program will be used to manage loss of material for personnel airlock, equipment hatch, CRD hatch, and other hatches and plugs.

Table 3.5.1 Summary of Aging Management Evaluations for Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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 ASME Section XI, Subsection IWE (B.2.1.30) program and the 10 CFR Part 50, Appendix J (B.2.1.33) program will be used to manage loss of leak tightness for personnel airlock, equipment hatch, CRD hatch, locks, hinges, and closure mechanisms.
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.2.1.30) program and the 10 CFR Part 50, Appendix J (B.2.1.33) program will be used to manage loss of preload due to self-loosening of containment closure and vacuum relief valve bolting.
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.2.1.30) program will be used to manage loss of material of containment closure bolting, vacuum relief bolting, steel elements (downcomers and bracing), diaphragm slab liner, downcomer jet deflectors and vacuum breaker valves and piping connected to the downcomers.

Table 3.5.1 Summary of Aging Management Evaluations for Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-32	Prestressing system: tendons; anchorage components	Loss of material due to corrosion	Chapter XI.S2, “ASME Section XI, Subsection IWL”	No	Not Applicable. The component, material, environment, and aging effect/mechanism combination does not apply. The LGS design does not use tendons or tendon anchorage components in the Primary Containment. The LGS Primary Containment uses conventional reinforcing steel.
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.2.1.33) program will be used to manage loss of sealing for seals and gaskets, and for electrical penetration assemblies associated with 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 (B.2.1.37) program will be used to manage the loss of coating integrity of service level 1 coatings in the Primary Containment.

Table 3.5.1 Summary of Aging Management Evaluations for 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 ASME Section XI, Subsection IWE (B.2.1.30) program and the 10 CFR Part 50, Appendix J (B.2.1.33) program will be used to manage the loss of material of concrete embedments, electrical penetration assemblies, penetration sleeves (including caps for spares), steel elements; liners, liner anchors, integral attachments (drywell and suppression chamber accessible areas) for the Primary Containment at LGS.
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.2.1.30) program will be used to manage the fretting or lockup for the drywell head. There are no surfaces subject to fretting or lockup for the downcomers.

Table 3.5.1 Summary of Aging Management Evaluations for 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 ASME Section XI, Subsection IWE (B.2.1.30) program and the 10 CFR Part 50, Appendix J (B.2.1.33) program will be used to manage the loss of material for electrical penetrations assemblies and penetration sleeves (including caps for spares) within the primary containment. The suppression chamber liner (interior surface) is addressed under Item Number 3.5.1-35.
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 component, material, environment, and aging effect/mechanism combination does not apply to the LGS Mark II concrete containment which utilizes a carbon steel material for the suppression chamber liner surfaces.

Table 3.5.1 Summary of Aging Management Evaluations for Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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 LGS Mark II concrete 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. LGS has braced downcomers. There is no vent line header applicable to the LGS 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.
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. Steel components contained within concrete exhibit no aging effects and do not require an aging management program as described in the GALL report.

Table 3.5.1 Summary of Aging Management Evaluations for Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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.2.1.35) program will be used to manage loss of material (spalling, scaling) and cracking in accessible and inaccessible areas. The LGS 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 7 percent. 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 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)	Not Applicable. The component, material, environment, and aging effect/mechanism combination does not apply. Fine and course aggregates conform to ASTM C33. Petrographic examinations of aggregates were performed in accordance with ASTM C295, ASTM C289, and other ASTM tests demonstrating that reactive aggregates were not used. In addition, concrete structures were constructed in accordance with ACI 318 per UFSAR 3.8.6. Cracking associated with expansion due to reaction with aggregates has not been observed on accessible portions of the LGS concrete structures. See Subsection 3.5.2.2.2.1.2.

Table 3.5.1 Summary of Aging Management Evaluations for Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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.2.1.35) program will be used to manage cracking and distortion of concrete in accessible and inaccessible locations for structures founded on soil. LGS does not rely on a de-watering system to control settlement. All seismic Category I plant facilities are founded on bedrock, except part of the spray pond, portions of the underground piping, and electrical ducts, diesel oil tanks, and valve pits, which are founded on weathered rock, natural soil or fills, which is located approximately 100 feet above the river. See Subsection 3.5.2.2.2.1.3

Table 3.5.1 Summary of Aging Management Evaluations for 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. LGS structures do not utilize porous concrete subfoundations and do not rely on a de-watering system to control settlement. All seismic Category I plant facilities are founded on bedrock, except part of the spray pond, portions of the underground piping, and electrical ducts, diesel oil tanks, and valve pits, which are founded on weathered rock, natural soil or fills, which is located approximately 100 feet above the river. 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. LGS structures do not utilize porous concrete subfoundations and do not rely on a de-watering system to control settlement. All seismic Category I plant facilities are founded on bedrock, except part of the spray pond, portions of the underground piping, and electrical ducts, diesel oil tanks, and valve pits, which are founded on weathered rock, natural soil or fills, which is located approximately 100 feet above the river. See Subsection 3.5.2.2.2.1.3.

Table 3.5.1 Summary of Aging Management Evaluations for 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.2.1.35) program will be used to manage increase in porosity and permeability; loss of strength for groups 1-5, 7-9 concrete and exterior above and below grade foundations. Although some leaching has been observed in the accessible areas it is not significant and did not impact an intended function. See Subsection 3.5.2.2.2.1.4.
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 LGS whose bulk average bulk temperature does not exceed 145 ° 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 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 Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36), will be used to manage loss of material (spalling, scaling) and cracking for Group 6 concrete structures for both accessible and inaccessible above-grade exterior surfaces. The LGS 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 7 percent. 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 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)	Not Applicable. The aging effect/mechanism does not apply to LGS Group 6 concrete structures. Fine and course aggregates conform to ASTM C33. Petrographic examinations of aggregates were performed in accordance with ASTM C295, ASTM C289, and other ASTM tests demonstrating that reactive aggregates were not used. In addition concrete structures were constructed in accordance with ACI 318 per UFSAR 3.8.6. See Subsection 3.5.2.2.2.3.2.
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 Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36), will be used to manage increase in porosity and permeability; loss of strength for Group 6 concrete for inaccessible below grade and foundation surfaces. Although some leaching has been observed in the accessible areas it is not significant and did not impact an intended function. See Subsection 3.5.2.2.2.3.3.

Table 3.5.1 Summary of Aging Management Evaluations for Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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. LGS does not have Group 7 or 8 structures. 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. LGS 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 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	Not Applicable. The aging effect/mechanism does not apply to LGS structural concrete accessible or inaccessible areas. Fine and course aggregates conform to ASTM C33. Petrographic examinations of aggregates were performed in accordance with ASTM C295, ASTM C289, and other ASTM tests demonstrating that reactive aggregates were not used. In addition, concrete structures were constructed in accordance with ACI 318 per UFSAR 3.8.6.
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.2.1.35) 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.

Table 3.5.1 Summary of Aging Management Evaluations for Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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. Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36), will be used to monitor loss of material for reinforced concrete exposed to flowing water. The Structures Monitoring (B.2.1.35) program has been substituted and will be used to manage loss of material for reinforced concrete exposed for the above grade concrete and concrete foundation of the Cooling Tower basin exposed to flowing water.
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.2.1.32) program will be used to manage loss of mechanical function due to corrosion, distortion, dirt, overload, fatigue due to vibratory and cyclic thermal loads for constant and variable load spring hangers, guides and stops.

Table 3.5.1 Summary of Aging Management Evaluations for Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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 Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36) program will be used to manage the loss of material, loss of form for earthen water-control structures and embankments.
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 Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36) program will be used to manage cracking, loss of bond and loss of material (spalling, scaling) of all Group 6 concrete accessible areas.
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 Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36) program will be used to manage loss of material (spalling, scaling) and cracking for accessible Group 6 concrete (above-grade, below-grade, and foundation).

Table 3.5.1 Summary of Aging Management Evaluations for Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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 Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36) program will be used to manage increase in porosity and permeability; loss of strength for accessible Group 6 concrete (above-grade, below-grade, and foundation).
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 LGS design does not utilize wooden piles or sheeting in group 6 structures.
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.2.1.35) program will be used to manage the 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 and foundation surfaces.

Table 3.5.1 Summary of Aging Management Evaluations for Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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.2.1.35) 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; foundation.
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.2.1.35) program will be used to manage cracking and 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, Groups 1-3, 5, 7-9 and Group 6 concrete in theinaccessible areas.
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.2.1.35) program will be used to manage cracking; loss of bond; and loss of material (spalling, scaling) for Groups 1-5, 7, 9 concrete in the accessible areas of interior and above-grade exterior surfaces.

Table 3.5.1 Summary of Aging Management Evaluations for Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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.2.1.35) 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, Groups 1-3, 5, 7-9 concrete in accessible and inaccessible areas; and in below-grade exterior; foundation, Group 6 concrete for inaccessible areas.
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. LGS does not use high strength structural bolts subject to SCC in this application.

Table 3.5.1 Summary of Aging Management Evaluations for 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. LGS does not use high strength structural bolts subject to SCC in structural connections. LGS 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.2.1.34) program as implemented by the Structures Monitoring (B.2.1.35) program will be used to manage cracking of structural masonry block walls. Components in the Fire Protection system have aligned to this item number based on the material, environment and aging effect, the Fire Protection (B.2.1.17) program will be added to manage cracking of fire barrier masonry block walls for this system.

Table 3.5.1 Summary of Aging Management Evaluations for Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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.2.1.34) program will be used to manage loss of material (spalling, scaling) and cracking for masonry walls.
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.2.1.35) program will be used to manage loss of sealing due to deterioration of seals, gaskets, and moisture barriers (caulking, flashing, and other sealants) of structures.
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. LGS 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.
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.2.1.35) program will be used to manage the loss of mechanical function for sliding support surfaces.

Table 3.5.1 Summary of Aging Management Evaluations for Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-75	Sliding surfaces	Loss of mechanical function due to corrosion, distortion, dirt, overload, wear	Chapter XI.S3, “ASME Section XI, Subsection IWF”	No	Consistent with NUREG-1801. The ASME Section XI, Subsection IWF (B.2.1.32) program will be used to manage the loss of mechanical function for ASME Class I sliding surfaces.
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. The LGS design does not use lubrite, fluorogold, or lubrofluor for the radial beam seats, but uses steel to steel for the seat and sliding surface material. The steel surface radial beam is addressed within Item Number 3.5.1-77 and the sliding surface is addressed within Item Number 3.5.1-74.
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.2.1.35) program will be used to manage the loss of material for steel components. Protective coatings are not relied upon to managing the effects of aging of steel components at LGS.

Table 3.5.1 Summary of Aging Management Evaluations for 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. The Water Chemistry (B.2.1.2) program will be used to manage cracking and loss of material for the fuel pool liner. Leakage from the spent fuel pool is fully contained in the leak chase drainage system and is routinely monitored for change in leakage.
3.5.1-79	Steel components: piles	Loss of material due to corrosion	Chapter XI.S6, “Structures Monitoring”	No	Not Applicable. Limerick does not utilize steel piles for the in-scope structures.
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.2.1.35) program will be used to manage the loss of material for structural bolting. Bolting components in the Cranes and Hoists System and the Fuel Handling and Storage 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 these two systems.

Table 3.5.1 Summary of Aging Management Evaluations for Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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.2.1.32) will be used to manage the loss of material of structural bolting used in ASME Class I, 2 or 3 piping and component and MC support applications.
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.2.1.35) program will be used to manage the loss of material for structural bolting.
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 Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36) program will be used to manage the loss of material for structural bolting associated with Group 6 structural components. The Structures Monitoring (B.2.1.35) program has been substituted and will be used to manage the aging effect of structural bolting exposed to flowing water for the carbon steel bolting in the Component Supports Commodity group.

Table 3.5.1 Summary of Aging Management Evaluations for Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-84	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	Not Applicable. LGS does not use stainless steel bolting in MC treated water applications. LGS does use Class I and Class 2 & 3 pipe and component support bolting in treated water which are addressed in Item Number 3.5.1-85.
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. The Water Chemistry (B.2.1.2) program and the ASME Section XI, Subsection IWF (B.2.1.32) program will be used to manage loss of material for stainless steel bolting exposed to treated water. 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 for portions of the fuel preparation machine which is partially exposed to treated water in the fuel pool.
3.5.1-86	Structural bolting	Loss of material due to pitting and crevice corrosion	Chapter XI.S3, "ASME Section XI, Subsection IWF"	No	Consistent with NUREG-1801. The ASME Section XI, Subsection IWF (B.2.1.32) program will be used to manage loss of material of structural bolting used for ASME Class 1, 2, and 3 piping and component supports.

Table 3.5.1 Summary of Aging Management Evaluations for 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.2.1.32) program will be used to manage loss of preload of structural bolting used for ASME Class 1, 2, and 3 piping and component supports.
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.2.1.35) program will be used to manage loss of preload for structural bolting. Bolting components in the Cranes and Hoists System and the Fuel Handling and Storage 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 structural bolting for loss of preload for these systems.
3.5.1-89	PWRs only.				

Table 3.5.1 Summary of Aging Management Evaluations for Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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. The Water Chemistry (B.2.1.2) program and the ASME Section XI, Subsection IWF (B.2.1.32) program will be used to manage loss of material of support members, weld, bolted connections, support anchorage to building structure used for ASME Class 1, 2, and 3 piping and component supports.
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.2.1.32) program will be used to manage loss of material of support members, bolted connections and supports anchored to building structure used for ASME Class 1, 2, and 3 piping and component supports.
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.2.1.35) program will be used to manage loss of material of support members, welds, bolted connections, and support anchorage to building structures for these bolting materials and environments.

Table 3.5.1 Summary of Aging Management Evaluations for Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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.2.1.35) program will be used to manage loss of material of support members, welds, bolted connections, and support anchorage to building structures for these bolting materials and environments. The Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36) program has been substituted and will be used to manage loss of material of support members, bolted connections and support anchorage to building for the Spray Pond and Pump House structures. The ASME Section XI, Subsection IWF (B.2.1.32) program will be substituted to manage loss of material of support members, bolted connections and support anchorage to building for ASME Class 1, 2, and 3 piping and component supports for these bolting materials and environment combinations.

Table 3.5.1 Summary of Aging Management Evaluations for Structures and Component Supports

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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 consistent with NUREG-1801. The Structures Monitoring (B.2.1.35) program will be used to manage the reduction or loss of isolation function of vibration isolation elements. The LGS design does not have the component vibration elements in Class I, Class 2 & 3 or MC components. The elastomeric type vibration isolation elements are associated primarily with HVAC equipment located within the in-scope structures at LGS.
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. LGS aging management review concluded that aluminum, galvanized steel and stainless steel components exposed to an air-indoor or concrete environment have no aging effects requiring aging management.

Table 3.5.2-1
220 and 500 kV Substations
Summary of Aging Management Evaluation

Table 3.5.2-1 220 and 500 kV Substations

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.2.1.35)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
		Galvanized Bolting	Air - Indoor, Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
Cable Trays	Structural Support	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
Concrete Anchors	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A

Table 3.5.2-1 220 and 500 kV Substations (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	Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Concrete Embedments	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	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
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Concrete: Equipment Foundation (accessible)	Structural Support	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
Concrete: Equipment Foundation (inaccessible)	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.35)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A

Table 3.5.2-1 220 and 500 kV Substations (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation (accessible) (Substation Control House slab and foundation)	Shelter, Protection	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-24	3.5.1-63	A
	Structural Support	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-24	3.5.1-63	A
Concrete: Foundation (inaccessible) (Substation Control House slab and foundation)	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.35)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A

Table 3.5.2-1 220 and 500 kV Substations (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation (inaccessible) (Substation Control House slab and foundation)	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-67	3.5.1-47	A
	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.35)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-67	3.5.1-47	A
Conduit	Shelter, Protection	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
	Structural Support	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
			Concrete	None	None	II.B2.1.CP-114	3.5.1-41	C
Doors	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C

Table 3.5.2-1 220 and 500 kV Substations (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.2.1.35)	III.A3.TP-302	3.5.1-77	C
Hatches/Plugs (includes manhole covers)	Flood Barrier	Ductile Cast Iron	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
	Shelter, Protection	Ductile Cast Iron	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
	Structural Support	Ductile Cast Iron	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
Manholes, & Duct Banks	Shelter, Protection	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	C
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	C
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	C
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-24	3.5.1-63	C
	Structural Support	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	C
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	C

Table 3.5.2-1 220 and 500 kV Substations (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Manholes, & Duct Banks	Structural Support	Reinforced concrete	Groundwater/Soil	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	C
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-24	3.5.1-63	C
Metal components: All structural members	Structural Support	Aluminum	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	A
		Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
Metal panels: (Including Roofing Panels)	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	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
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	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
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
Miscellaneous steel (includes floor grating)	Structural Support	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C

Table 3.5.2-1 220 and 500 kV Substations (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Panels, Racks, Cabinets, and Other Enclosures	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	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
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	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
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Flood Barrier	Elastomer	Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
	Shelter, Protection	Elastomer	Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
Transmission Towers (includes takeoff towers)	Structural Support	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
		Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A

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 3.5.2-2
Admin Building Shop and Warehouse
Summary of Aging Management Evaluation

Table 3.5.2-2 Admin Building Shop and Warehouse

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.2.1.35)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
		Galvanized Bolting	Air - Indoor, Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
				None	None	III.B5.TP-8	3.5.1-95	C
Concrete Anchors	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Concrete Embedments	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	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.B5.TP-8	3.5.1-95	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Concrete: Above-grade exterior (accessible)	Shelter, Protection	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A

Table 3.5.2-2 Admin Building Shop and Warehouse (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)	Structural Support	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
Concrete: Above-grade exterior (inaccessible)	Shelter, Protection	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-108	3.5.1-42	A
Concrete: Below-grade exterior (inaccessible)	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A2.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.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A2.TP-67	3.5.1-47	A

Table 3.5.2-2 Admin Building Shop and Warehouse (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation (inaccessible)	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
	Structural Support	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
Doors	Shelter, Protection	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
		Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C

Table 3.5.2-2 Admin Building Shop and Warehouse (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Doors	Shelter, Protection	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
Masonry walls: Interior	Structural Support	Concrete Block	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Cracking	Masonry Walls (B.2.1.34)	III.A3.T-12	3.5.1-70	A
Metal components: All structural members	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	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
Metal decking	Structural Support	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
Miscellaneous steel (catwalks, stairs, handrails, ladders, vents and louvers, platforms, etc.)	Shelter, Protection	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	A
Panels, Racks, Cabinets, and Other Enclosures	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C

Table 3.5.2-2 Admin Building Shop and Warehouse (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	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A, 1
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A, 1
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A, 1
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A, 1
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A, 1
Penetration sleeves	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			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
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Precast Panel	Shelter, Protection	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A

Table 3.5.2-2 Admin Building Shop and Warehouse (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Precast Panel	Shelter, Protection	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-24	3.5.1-63	A
Roofing: (Built Up Roofing)	Shelter, Protection	Elastomer	Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
Roofing: (Scuppers)	Direct Flow	Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
		PVC	Air - Outdoor	None	None			J
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Shelter, Protection	Aluminum	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
		Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
Seismic Gap Filler	Expansion/ Separation	Elastomer	Air - Indoor, Uncontrolled	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring (B.2.1.35)	VII.G.A-19	3.3.1-57	E, 2
			Air - Outdoor	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring (B.2.1.35)	VII.G.A-20	3.3.1-57	E, 2
Windows (includes Glass Panels)	Shelter, Protection	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

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. NUREG-1801 does not contain grout penetration seals, however cracking, loss of bond and 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.2.1.35) program.

2. The Structures Monitoring (B.2.1.35) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.5.2-3
Auxiliary Boiler and Lube Oil Storage Enclosure
Summary of Aging Management Evaluation

Table 3.5.2-3 Auxiliary Boiler and Lube Oil Storage Enclosure

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.2.1.35)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
		Galvanized Bolting	Air - Indoor, Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
				None	None	III.B5.TP-8	3.5.1-95	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
Cable Trays and Gutters	Structural Support	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
Concrete Anchors	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Concrete Embedments	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C

Table 3.5.2-3 Auxiliary Boiler and Lube Oil Storage Enclosure (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	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Concrete: Below-grade exterior (inaccessible)	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A2.TP-67	3.5.1-47	A
Concrete: Foundation (inaccessible)	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.35)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A

Table 3.5.2-3 Auxiliary Boiler and Lube Oil Storage Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation (inaccessible)	Shelter, Protection	Reinforced concrete	Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-67	3.5.1-47	A
	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.35)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
	Structural Support	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
Conduit	Shelter, Protection	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
	Structural Support	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
Doors	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
		Glass	Air - Indoor, Uncontrolled	None	None	VII.J.AP-14	3.3.1-117	C

Table 3.5.2-3 Auxiliary Boiler and Lube Oil Storage Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Doors	Shelter, Protection	Glass	Air - Outdoor	None	None	VII.J.AP-167	3.3.1-117	C
Hatches/Plugs	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.2.1.35)	III.A3.TP-302	3.5.1-77	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.2.1.35)	III.A3.TP-302	3.5.1-77	C
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.2.1.35)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.34)	III.A3.T-12	3.5.1-70	A, 1
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.34)	III.A3.T-12	3.5.1-70	A, 1
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	C
	Structural Support	Concrete Block	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.34)	III.A3.T-12	3.5.1-70	A, 1
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.34)	III.A3.T-12	3.5.1-70	A, 1
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	C
Metal components: All structural members	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A

Table 3.5.2-3 Auxiliary Boiler and Lube Oil Storage Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Metal components: All structural members	Structural Support	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
Metal decking	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	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
Metal siding	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
Miscellaneous steel (catwalks, stairs, handrails, ladders, vents and louvers, platforms, etc.)	Filter	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
	Shelter, Protection	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
		Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	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
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-6	3.5.1-93	C
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A

Table 3.5.2-3 Auxiliary Boiler and Lube Oil Storage Enclosure (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, vents and louvers, platforms, etc.)	Structural Support	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	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
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-6	3.5.1-93	C
Panels, Racks, Cabinets, and Other Enclosures	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	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
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	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
Penetration seals	Shelter, Protection	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	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.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A, 2
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-212	3.5.1-65	A, 2

Table 3.5.2-3 Auxiliary Boiler and Lube Oil Storage Enclosure (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	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A, 2
Penetration sleeves	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			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
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Precast Panel	Shelter, Protection	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	C
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-24	3.5.1-63	C
Roofing: (Built up Roofing)	Shelter, Protection	Elastomer	Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
Roofing: (Scuppers)	Direct Flow	PVC	Air - Outdoor	None	None			J
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Shelter, Protection	Aluminum	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-6	3.5.1-93	C

Table 3.5.2-3 Auxiliary Boiler and Lube Oil Storage Enclosure (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)	Shelter, Protection	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
Seismic Gap Filler	Expansion/ Separation	Elastomer	Air - Indoor, Uncontrolled	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring (B.2.1.35)	VII.G.A-19	3.3.1-57	E, 3
			Air - Outdoor	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring (B.2.1.35)	VII.G.A-20	3.3.1-57	E, 3
Tube Track	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C

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.2.1.35) program, which includes the ten attributes of NUREG-1801 Masonry Wall (B.2.1.34) program.

2. NUREG-1801 does not contain grout penetration seals, however cracking, loss of bond and 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.2.1.35) program.

3. The Structures Monitoring (B.2.1.35) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.5.2-4
Circulating Water Pump House
Summary of Aging Management Evaluation

Table 3.5.2-4 Circulating Water Pump 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.2.1.35)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
		Galvanized Steel	Air - Indoor, Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
				None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
Cable Trays and Gutters	Structural Support	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
Concrete Anchors	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A

Table 3.5.2-4 Circulating Water Pump House (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 - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-24	3.5.1-63	A
Concrete Embedments	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			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
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	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)	Shelter, Protection	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
Concrete: Above-grade exterior (inaccessible)	Shelter, Protection	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-108	3.5.1-42	A

Table 3.5.2-4 Circulating Water Pump 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)	Structural Support	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-108	3.5.1-42	A
Concrete: Below-grade exterior (inaccessible)	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-67	3.5.1-47	A
Concrete: Foundation (inaccessible)	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-67	3.5.1-47	A

Table 3.5.2-4 Circulating Water Pump House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation (inaccessible)	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
	Structural Support	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
Conduit	Shelter, Protection	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
	Structural Support	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
Doors	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
Hatches/Plugs	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C

Table 3.5.2-4 Circulating Water Pump 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	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Cracking	Masonry Walls (B.2.1.34)	III.A3.T-12	3.5.1-70	A
				Loss of Material (Spalling, Scaling) and Cracking	Masonry Walls (B.2.1.34)	III.A5.TP-34	3.5.1-71	A
	Structural Support	Concrete Block	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Cracking	Masonry Walls (B.2.1.34)	III.A3.T-12	3.5.1-70	A
				Loss of Material (Spalling, Scaling) and Cracking	Masonry Walls (B.2.1.34)	III.A5.TP-34	3.5.1-71	A
Masonry walls: Interior	Shelter, Protection	Concrete Block	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Cracking	Masonry Walls (B.2.1.34)	III.A3.T-12	3.5.1-70	A
	Structural Support	Concrete Block	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Cracking	Masonry Walls (B.2.1.34)	III.A3.T-12	3.5.1-70	A
Metal components: All structural members	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
Metal decking	Structural Support	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	A
Miscellaneous steel (catwalks, stairs, handrails, ladders, vents and louvers, platforms, etc.)	Shelter, Protection	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	A

Table 3.5.2-4 Circulating Water Pump House (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, vents and louvers, platforms, etc.)	Shelter, Protection	Aluminum	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	A
	Structural Support	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	A
Panels, Racks, Cabinets, and Other Enclosures	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B3.TP-8	3.5.1-95	C
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B3.TP-8	3.5.1-95	C
Penetration seals	Shelter, Protection	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A, 1
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A, 1
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A, 1
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A, 1

Table 3.5.2-4 Circulating Water Pump House (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	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A, 1
	Structural Support	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A, 1
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A, 1
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A, 1
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A, 1
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A, 1
Penetration sleeves	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.1.CP-114	3.5.1-41	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.2.1.35)	III.B2.TP-6	3.5.1-93	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C

Table 3.5.2-4 Circulating Water Pump House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Precast Panel	Shelter, Protection	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
Roofing: (Built up Roofing)	Shelter, Protection	Elastomer	Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
Roofing: (Scuppers)	Direct Flow	Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Shelter, Protection	Aluminum	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
		Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
Steel elements: (Birdscreen)	Filter	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
Tube Track	Shelter, Protection	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	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	C
		Stainless Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C

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. NUREG-1801 does not contain grout penetration seals, however cracking, loss of bond and 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.2.1.35) program.

Table 3.5.2-5
Component Supports Commodities Group
Summary of Aging Management Evaluation

Table 3.5.2-5 Component Supports Commodities 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 Anchor Capacity Due to Local Concrete Degradation	Structures Monitoring (B.2.1.35)	III.B1.1.TP-42	3.5.1-55	A
		Reinforced concrete	Air - Indoor, Uncontrolled	Reduction in Anchor Capacity Due to Local Concrete Degradation	Structures Monitoring (B.2.1.35)	III.B1.1.TP-42	3.5.1-55	A
Supports for ASME Class 1 Piping and Components (Support members; constant and variable guides and stops, welds; bolted connections; sliding plates; support anchorage to building structure)	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.1.T-24	3.5.1-91	A
				Loss of Mechanical Function	ASME Section XI, Subsection IWF (B.2.1.32)	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.2.1.32)	III.B1.1.TP-226	3.5.1-81	A

Table 3.5.2-5 Component Supports Commodities 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 (Support members; constant and variable guides and stops, welds; bolted connections; sliding plates; support anchorage to building structure)	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Preload	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.1.TP-229	3.5.1-87	A
		Galvanized Bolting	Air - Indoor, Uncontrolled	Loss of Preload	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.1.TP-229	3.5.1-87	A
				None	None	III.B1.1.TP-8	3.5.1-95	C
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B1.1.TP-8	3.5.1-95	A
		Lubrite	Air - Indoor, Uncontrolled	Loss of Mechanical Function	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.1.TP-45	3.5.1-75	A
		Stainless Steel	Air - Indoor, Uncontrolled	None	None	III.B1.1.TP-8	3.5.1-95	A
			Treated Water	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.1.TP-232	3.5.1-85	C
					Water Chemistry (B.2.1.2)	III.B1.1.TP-232	3.5.1-85	C
		Stainless Steel Bolting	Air - Indoor, Uncontrolled	Loss of Preload	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.1.TP-229	3.5.1-87	A
				None	None	III.B1.1.TP-8	3.5.1-95	C
			Treated Water	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.1.TP-232	3.5.1-85	A
					Water Chemistry (B.2.1.2)	III.B1.1.TP-232	3.5.1-85	A

Table 3.5.2-5 Component Supports Commodities 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 locations of expansion and grouted anchors; grout pads for support base plates)	Structural Support	Grout	Air - Indoor, Uncontrolled	Reduction in Anchor Capacity Due to Local Concrete Degradation	Structures Monitoring (B.2.1.35)	III.B1.2.TP-42	3.5.1-55	A
			Air - Outdoor	Reduction in Anchor Capacity Due to Local Concrete Degradation	Structures Monitoring (B.2.1.35)	III.B1.2.TP-42	3.5.1-55	A
		Reinforced concrete	Air - Indoor, Uncontrolled	Reduction in Anchor Capacity Due to Local Concrete Degradation	Structures Monitoring (B.2.1.35)	III.B1.2.TP-42	3.5.1-55	A
			Air - Outdoor	Reduction in Anchor Capacity Due to Local Concrete Degradation	Structures Monitoring (B.2.1.35)	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.2.1.32)	III.B1.2.T-24	3.5.1-91	C
				Loss of Mechanical Function	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.2.T-28	3.5.1-57	A
			Air - Outdoor	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.2.T-24	3.5.1-91	C
				Loss of Mechanical Function	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.2.T-28	3.5.1-57	A
			Treated Water	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.1.TP-10	3.5.1-90	C

Table 3.5.2-5 Component Supports Commodities 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 (Constant and variable load spring hangers; guides; stops)	Structural Support	Carbon Steel	Treated Water	Loss of Material	Water Chemistry (B.2.1.2)	III.B1.1.TP-10	3.5.1-90	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.2.1.32)	III.B1.2.T-24	3.5.1-91	A
			Air - Outdoor	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.2.T-24	3.5.1-91	A
			Treated Water	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.32)	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	A
		Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.2.TP-226	3.5.1-81	A
				Loss of Preload	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.2.TP-229	3.5.1-87	A
			Air - Outdoor	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.2.TP-235	3.5.1-86	A
				Loss of Preload	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.2.TP-229	3.5.1-87	A
			Treated Water	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.32)	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	A

Table 3.5.2-5 Component Supports Commodities 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 and Low Alloy Steel Bolting	Treated Water	Loss of Preload	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.2.TP-229	3.5.1-87	A
		Galvanized Bolting	Air - Indoor, Uncontrolled	Loss of Preload	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.2.TP-229	3.5.1-87	A
				None	None	III.B1.2.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.2.TP-235	3.5.1-86	A
				Loss of Preload	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.2.TP-229	3.5.1-87	A
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B1.2.TP-8	3.5.1-95	A
			Air - Outdoor	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.2.T-24	3.5.1-91	A
		Stainless Steel	Air - Indoor, Uncontrolled	None	None	III.B1.2.TP-8	3.5.1-95	A
			Air - Outdoor	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.2.T-24	3.5.1-91	C
			Treated Water	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.32)	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	C
		Stainless Steel Bolting	Air - Indoor, Uncontrolled	Loss of Preload	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.2.TP-229	3.5.1-87	A
				None	None	III.B1.2.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.2.T-24	3.5.1-91	C

Table 3.5.2-5 Component Supports Commodities 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	Stainless Steel Bolting	Air - Outdoor	Loss of Preload	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.2.TP-229	3.5.1-87	A
			Treated Water	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.32)	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	A
				Loss of Preload	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.2.TP-229	3.5.1-87	A
Supports for Cable Trays, Gutter, 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.2.1.35)	III.B2.TP-43	3.5.1-92	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-43	3.5.1-92	A
		Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.B2.TP-261	3.5.1-88	A

Table 3.5.2-5 Component Supports Commodities 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, Gutter, 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 and Low Alloy Steel Bolting	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.B2.TP-261	3.5.1-88	A
		Elastomer	Air - Indoor, Uncontrolled	Reduction or loss of isolation function	Structures Monitoring (B.2.1.35)	III.B4.TP-44	3.5.1-94	E, 1
			Air - Outdoor	Reduction or loss of isolation function	Structures Monitoring (B.2.1.35)	III.B4.TP-44	3.5.1-94	E, 1
		Galvanized Bolting	Air - Indoor, Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.35)	III.B2.TP-261	3.5.1-88	A
				None	None	III.B2.TP-8	3.5.1-95	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.B2.TP-43	3.5.1-92	A
		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.2.1.35)	III.B2.TP-261	3.5.1-88	A

Table 3.5.2-5 Component Supports Commodities 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, Gutter, Conduit, HVAC Ducts, Tube Track, Instrument Tubing, Non-ASME Piping and Components (Support members; welds; bolted connections; support anchorage to building structure)	Structural Support	Stainless Steel Bolting	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	A
Supports for Cable Trays, Gutters, Conduit, HVAC Ducts, Tube Track, Instrument Tubing, Non-ASME Piping and Components (Building concrete at locations of expansion and grouted anchors; grout pads for support base plates)	Structural Support	Concrete	Air - Indoor, Uncontrolled	Reduction in Anchor Capacity Due to Local Concrete Degradation	Structures Monitoring (B.2.1.35)	III.B2.TP-42	3.5.1-55	A
			Air - Outdoor	Reduction in Anchor Capacity Due to Local Concrete Degradation	Structures Monitoring (B.2.1.35)	III.B2.TP-42	3.5.1-55	A
		Grout	Air - Indoor, Uncontrolled	Reduction in Anchor Capacity Due to Local Concrete Degradation	Structures Monitoring (B.2.1.35)	III.B2.TP-42	3.5.1-55	A
			Air - Outdoor	Reduction in Anchor Capacity Due to Local Concrete Degradation	Structures Monitoring (B.2.1.35)	III.B2.TP-42	3.5.1-55	A

Table 3.5.2-5 Component Supports Commodities Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Supports for HVAC System Components, and Other Misc Mechanical Equipment (Vibration isolation elements)	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-43	3.5.1-92	C
		Elastomer	Air - Indoor, Uncontrolled	Reduction or Loss of Isolation Function	Structures Monitoring (B.2.1.35)	III.B4.TP-44	3.5.1-94	E, 1
	Vibration Isolation	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-43	3.5.1-92	C
		Elastomer	Air - Indoor, Uncontrolled	Reduction or Loss of Isolation Function	Structures Monitoring (B.2.1.35)	III.B4.TP-44	3.5.1-94	E, 1
Supports for HVAC System Components, and Other Miscellaneous Mechanical Equipment	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-43	3.5.1-92	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-43	3.5.1-92	A
		Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.B4.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.B4.TP-261	3.5.1-88	A
		Galvanized Bolting	Air - Indoor, Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.35)	III.B4.TP-261	3.5.1-88	A
				None	None	III.B4.TP-8	3.5.1-95	A

Table 3.5.2-5 Component Supports Commodities Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Supports for HVAC System Components, and Other Miscellaneous Mechanical Equipment	Structural Support	Galvanized Bolting	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.B4.TP-6	3.5.1-93	A
Supports for HVAC System Components, and Other Miscellaneous Mechanical Equipment (Building concrete at locations of grouted anchors; grout pads for support base plates)	Structural Support	Concrete	Air - Indoor, Uncontrolled	Reduction in Anchor Capacity Due to Local Concrete Degradation	Structures Monitoring (B.2.1.35)	III.B4.TP-42	3.5.1-55	A
			Air - Outdoor	Reduction in Anchor Capacity Due to Local Concrete Degradation	Structures Monitoring (B.2.1.35)	III.B4.TP-42	3.5.1-55	A
		Grout	Air - Indoor, Uncontrolled	Reduction in Anchor Capacity Due to Local Concrete Degradation	Structures Monitoring (B.2.1.35)	III.B4.TP-42	3.5.1-55	A
			Air - Outdoor	Reduction in Anchor Capacity Due to Local Concrete Degradation	Structures Monitoring (B.2.1.35)	III.B4.TP-42	3.5.1-55	A

Table 3.5.2-5 Component Supports Commodities 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	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.B5.TP-43	3.5.1-92	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B5.TP-43	3.5.1-92	A
		Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.B5.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.B5.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B5.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.B5.TP-261	3.5.1-88	A
Supports for Platforms, Jet Impingement Shields, Masonry Walls, and Other Miscellaneous Structures (Building concrete at locations of expansion and grouted anchors; grout pads for support base plates)	Structural Support	Concrete	Air - Indoor, Uncontrolled	Reduction in Anchor Capacity Due to Local Concrete Degradation	Structures Monitoring (B.2.1.35)	III.B5.TP-42	3.5.1-55	A
			Air - Outdoor	Reduction in Anchor Capacity Due to Local Concrete Degradation	Structures Monitoring (B.2.1.35)	III.B5.TP-42	3.5.1-55	A

Table 3.5.2-5 Component Supports Commodities 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 (Building concrete at locations of expansion and grouted anchors; grout pads for support base plates)	Structural Support	Grout	Air - Indoor, Uncontrolled	Reduction in Anchor Capacity Due to Local Concrete Degradation	Structures Monitoring (B.2.1.35)	III.B5.TP-42	3.5.1-55	A
			Air - Outdoor	Reduction in Anchor Capacity Due to Local Concrete Degradation	Structures Monitoring (B.2.1.35)	III.B5.TP-42	3.5.1-55	A
Supports for Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.B3.TP-43	3.5.1-92	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B3.TP-43	3.5.1-92	A
		Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.B3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.B3.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.B3.TP-261	3.5.1-88	A

Table 3.5.2-5 Component Supports Commodities 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	Structural Support	Galvanized Bolting	Air - Indoor, Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.35)	III.B3.TP-261	3.5.1-88	A
				None	None	III.B3.TP-8	3.5.1-95	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.B3.TP-43	3.5.1-92	A
Supports for Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (Building concrete and grout pads for support)	Structural Support	Grout	Air - Indoor, Uncontrolled	Reduction in Anchor Capacity Due to Local Concrete Degradation	Structures Monitoring (B.2.1.35)	III.B3.TP-42	3.5.1-55	A
			Air - Outdoor	Reduction in Anchor Capacity Due to Local Concrete Degradation	Structures Monitoring (B.2.1.35)	III.B3.TP-42	3.5.1-55	A
		Reinforced concrete	Air - Indoor, Uncontrolled	Reduction in Anchor Capacity Due to Local Concrete Degradation	Structures Monitoring (B.2.1.35)	III.B3.TP-42	3.5.1-55	A
			Air - Outdoor	Reduction in Anchor Capacity Due to Local Concrete Degradation	Structures Monitoring (B.2.1.35)	III.B3.TP-42	3.5.1-55	A

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 Structures Monitoring (B.2.1.35) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.5.2-6
Control Enclosure
Summary of Aging Management Evaluation

Table 3.5.2-6 Control Enclosure

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
Bolting (Structural)	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A1.TP-261	3.5.1-88	A
		Galvanized Bolting	Air - Indoor, Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.35)	III.A1.TP-261	3.5.1-88	A
				None	None	III.B5.TP-8	3.5.1-95	A
		Stainless Steel Bolting	Air - Indoor, Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.35)	III.A1.TP-261	3.5.1-88	A
				None	None	III.B5.TP-8	3.5.1-95	A
Cable Trays and Gutters	Structural Support	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	A
		Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-43	3.5.1-92	A
Concrete Anchors	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A1.TP-26	3.5.1-66	A

Table 3.5.2-6 Control Enclosure (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 - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.TP-23	3.5.1-64	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A1.TP-24	3.5.1-63	A
Concrete Embedments	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	A
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
Concrete: Above-grade exterior (accessible)	Flood Barrier	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A1.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A1.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A

Table 3.5.2-6 Control Enclosure (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)	Shelter, Protection	Reinforced concrete	Air - Outdoor	Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A1.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.TP-23	3.5.1-64	A
	Structural Pressure Boundary	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A1.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.TP-23	3.5.1-64	A
Concrete: Above-grade exterior (inaccessible)	Flood Barrier	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A

Table 3.5.2-6 Control Enclosure (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)	Flood Barrier	Reinforced concrete	Air - Outdoor	Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A6.TP-104	3.5.1-65	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A6.TP-104	3.5.1-65	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A6.TP-104	3.5.1-65	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.TP-108	3.5.1-42	A
	Structural Pressure Boundary	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A

Table 3.5.2-6 Control Enclosure (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)	Structural Pressure Boundary	Reinforced concrete	Air - Outdoor	Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A6.TP-104	3.5.1-65	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.TP-108	3.5.1-42	A
Concrete: Below-grade exterior (accessible)	Structural Pressure Boundary	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	C
Concrete: Below-grade exterior (inaccessible)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A1.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A1.TP-67	3.5.1-47	A

Table 3.5.2-6 Control Enclosure (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)	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A1.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A1.TP-67	3.5.1-47	A
Concrete: Foundation (inaccessible)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A1.TP-212	3.5.1-65	A

Table 3.5.2-6 Control Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation (inaccessible)	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A1.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A1.TP-26	3.5.1-66	A
	Missile Barrier	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
	Shelter, Protection	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
	Shielding	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
	Structural Pressure Boundary	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
	Structural Support	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A

Table 3.5.2-6 Control Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
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
	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
Doors	Flood Barrier	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
	HELB/MELB Shielding	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
	Missile Barrier	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
	Structural Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
Equipment supports and foundations	Structural Support	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	C
Hatches/Plugs	Missile Barrier	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A1.TP-26	3.5.1-66	A
	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A1.TP-26	3.5.1-66	A
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C

Table 3.5.2-6 Control Enclosure (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	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
Masonry walls: Interior	Shelter, Protection	Concrete Block	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.34)	III.A1.T-12	3.5.1-70	A
	Shielding	Concrete Block	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.34)	III.A1.T-12	3.5.1-70	A
	Structural Support	Concrete Block	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.34)	III.A1.T-12	3.5.1-70	A
Metal components: All structural members	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
Metal panels	Structural Support	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B3.TP-8	3.5.1-95	C
		Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
Miscellaneous steel (catwalks, stairs, handrails, ladders, vents and louvers, platforms, etc.)	Shelter, Protection	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
		Stainless Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C

Table 3.5.2-6 Control Enclosure (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, vents and louvers, platforms, etc.)	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	A
Panels, Racks, Cabinets, and Other Enclosures	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
		Galvanized 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.2.1.35)	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.2.1.35)	III.A1.TP-26	3.5.1-66	A, 1
	HELB/MELB Shielding	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A1.TP-26	3.5.1-66	A, 1
	Shelter, Protection	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A1.TP-26	3.5.1-66	A, 1
	Shielding	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A1.TP-26	3.5.1-66	A, 1
	Structural Pressure Boundary	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A

Table 3.5.2-6 Control Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Penetration seals	Structural Pressure Boundary	Grout	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A, 1
Penetration sleeves	Flood Barrier	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
	Structural Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Roofing	Shelter, Protection	Elastomer	Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Flood Barrier	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
	HELB/MELB Shielding	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
	Shelter, Protection	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
		Stainless Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
	Structural Pressure Boundary	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
Seismic Gap Filler	Expansion/ Separation	Elastomer	Air - Indoor, Uncontrolled	Increased hardness, shrinkage and loss of strength	Structures Monitoring (B.2.1.35)	VII.G.A-19	3.3.1-57	E, 2

Table 3.5.2-6 Control Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Seismic Gap Filler	Expansion/ Separation	Elastomer	Air - Outdoor	Increased hardness, shrinkage and loss of strength	Structures Monitoring (B.2.1.35)	VII.G.A-20	3.3.1-57	E, 2
Steel elements: (Birdscreen)	Filter	Galvanized Bolting	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A1.TP-261	3.5.1-88	A
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
Steel elements: liner(sump), integral attachments	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
			Raw Water	Loss of Material	Structures Monitoring (B.2.1.35)	VII.H2.AP-55	3.3.1-41	E, 2
Tube Track	Shelter, Protection	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
		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
		Stainless Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	A

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. NUREG-1801 does not contain grout penetration seals, however cracking , loss of bond, and loss of material are applicable aging effects for both grout and concrete, and are managed for grout penetration seals by the Structures Monitoring (B.2.1.35) program.

2. The Structures Monitoring (B.2.1.35) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.5.2-7
Cooling Towers
Summary of Aging Management Evaluation

Table 3.5.2-7 Cooling Towers

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Above-grade exterior and interior (accessible) (includes basin curb wall, inlet and outlet walls)	Structural Support	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
			Water - Flowing	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)			H, 1
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)			H, 1
				Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-24	3.5.1-63	A
				Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.T-20	3.5.1-56	E, 2
	Water retaining boundary	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
			Water - Flowing	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)			H, 1

Table 3.5.2-7 Cooling Towers (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 and interior (accessible) (includes basin curb wall, inlet and outlet walls)	Water retaining boundary	Reinforced concrete	Water - Flowing	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)			H, 1
				Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-24	3.5.1-63	A
				Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.T-20	3.5.1-56	E, 2
Concrete: Foundation (accessible) (Basin Slab)	Structural Support	Reinforced concrete	Water - Flowing	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)			H, 1
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)			H, 1
				Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-24	3.5.1-63	A
				Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.T-20	3.5.1-56	E, 2
	Water retaining boundary	Reinforced concrete	Water - Flowing	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)			H, 1
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)			H, 1
				Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-24	3.5.1-63	A

Table 3.5.2-7 Cooling Towers (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation (accessible) (Basin Slab)	Water retaining boundary	Reinforced concrete	Water - Flowing	Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.T-20	3.5.1-56	E, 2
Concrete: Foundation (inaccessible) (Basin Slab)	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
	Water retaining boundary	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Water retaining boundary	Elastomer	Raw Water	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A

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 component type, material, and environment combination is not found in NUREG 1801. The Structures Monitoring (B.2.1.35) program is used to manage the aging effect(s) applicable to this component type, material and environment combination.

2. The Structures Monitoring (B.2.1.35) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.5.2-8
Diesel Oil Storage Tank Structures
Summary of Aging Management Evaluation

Table 3.5.2-8 Diesel Oil Storage Tank 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.2.1.35)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
		Galvanized Bolting	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
		Stainless Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
				Loss of Preload	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Concrete: Above-grade exterior (accessible) (valve pits)	Flood Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A

Table 3.5.2-8 Diesel Oil Storage Tank Structures (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) (valve pits)	Missile Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
Concrete: Below-grade (inaccessible) (walls, and base of valve pits)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A

Table 3.5.2-8 Diesel Oil Storage Tank 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 (inaccessible) (walls, and base of valve pits)	Missile Barrier	Reinforced concrete	Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-67	3.5.1-47	A
Concrete: Below-grade interior (accessible) walls, ceiling, base slab	Flood Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
	Missile Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A

Table 3.5.2-8 Diesel Oil Storage Tank 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 interior (accessible) walls, ceiling, base slab	Missile Barrier	Reinforced concrete	Air - Outdoor	Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
Concrete: Foundation (inaccessible) (base slab)	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
Conduit	Shelter, Protection	Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
	Structural Support	Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Hatches/Plugs (including manhole cover)	Flood Barrier	Ductile Cast Iron	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C

Table 3.5.2-8 Diesel Oil Storage Tank Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Hatches/Plugs (including manhole cover)	Shelter, Protection	Ductile Cast Iron	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
	Structural Support	Ductile Cast Iron	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
Miscellaneous steel (ladders)	Structural Support	Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
Penetration seals	Flood Barrier	Elastomer	Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
		Grout	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A, 1
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A, 1
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A, 1
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A, 1
	Shelter, Protection	Elastomer	Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
		Grout	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A, 1
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A, 1

Table 3.5.2-8 Diesel Oil Storage Tank Structures (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.2.1.35)	III.A3.TP-212	3.5.1-65	A, 1
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A, 1
Penetration sleeves	Flood Barrier	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	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.2.1.35)	VII.C1.AP-198	3.3.1-106	E, 2
	Shelter, Protection	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	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.2.1.35)	VII.C1.AP-198	3.3.1-106	E, 2
	Structural Support	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	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.2.1.35)	VII.C1.AP-198	3.3.1-106	E, 2
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Flood Barrier	Elastomer	Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
	Shelter, Protection	Elastomer	Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A

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. NUREG-1801 does not contain grout penetration seals, however cracking, loss of bond and 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.2.1.35) program.

2. The Structures Monitoring (B.2.1.35) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.5.2-9
Emergency Diesel Generator Enclosure
Summary of Aging Management Evaluation

Table 3.5.2-9 Emergency Diesel Generator Enclosure

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.2.1.35)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
		Galvanized Bolting	Air - Indoor, Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
				None	None	III.B5.TP-8	3.5.1-95	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
Cable Trays and Gutters	Structural Support	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
Concrete Anchors	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A

Table 3.5.2-9 Emergency Diesel Generator Enclosure (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 - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-24	3.5.1-63	A
Concrete Embedments	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	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
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Concrete: Above-grade exterior (accessible)	Missile Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A

Table 3.5.2-9 Emergency Diesel Generator Enclosure (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)	Missile Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-108	3.5.1-42	A
Concrete: Below-grade exterior (inaccessible)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-67	3.5.1-47	A

Table 3.5.2-9 Emergency Diesel Generator Enclosure (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)	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-67	3.5.1-47	A
Concrete: Foundation (inaccessible)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-212	3.5.1-65	A

Table 3.5.2-9 Emergency Diesel Generator Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation (inaccessible)	Structural Support	Reinforced concrete	Groundwater/Soil	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
	Shelter, Protection	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
	Structural Support	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
Conduit	Shelter, Protection	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
	Structural Support	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
Doors	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
Equipment supports and foundations	Structural Support	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
Hatches/Plugs	Missile Barrier	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A

Table 3.5.2-9 Emergency Diesel Generator Enclosure (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	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
Metal components: All structural members	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
Metal decking	Structural Support	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
Metal panels	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C

Table 3.5.2-9 Emergency Diesel Generator Enclosure (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, vents and louvers, platforms, etc.)	Filter	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-6	3.5.1-93	C
	Shelter, Protection	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	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.2.1.35)	III.B4.TP-6	3.5.1-93	C
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	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
Panels, Racks, Cabinets, and Other Enclosures	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	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
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	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
Penetration seals	Flood Barrier	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A

Table 3.5.2-9 Emergency Diesel Generator Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Penetration seals	Flood Barrier	Grout	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A, 1
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A, 1
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A, 1
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A, 1
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A, 1
	Shelter, Protection	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A, 1
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A, 1
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A, 1
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A, 1
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A, 1

Table 3.5.2-9 Emergency Diesel Generator Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Penetration sleeves	Flood Barrier	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Roofing	Shelter, Protection	Elastomer	Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
Roofing: (Scuppers)	Direct Flow	Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Shelter, Protection	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
		Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
		Stainless Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
Seismic Gap Filler	Expansion/ Separation	Elastomer	Air - Indoor, Uncontrolled	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring (B.2.1.35)	VII.G.A-19	3.3.1-57	E, 2

Table 3.5.2-9 Emergency Diesel Generator Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Seismic Gap Filler	Expansion/ Separation	Elastomer	Air - Outdoor	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring (B.2.1.35)	VII.G.A-20	3.3.1-57	E, 2
Tube Track	Shelter, Protection	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	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	C
		Stainless Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C

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. NUREG-1801 does not contain grout penetration seals, however cracking, loss of bond and 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.2.1.35) program.

2. The Structures Monitoring (B.2.1.35) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.5.2-10
Piping and Component Insulation Commodity Group
Summary of Aging Management Evaluation

Table 3.5.2-10 Piping and Component Insulation Commodity Group

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Insulation	Thermal Insulation	Calcium Silicate	Air - Indoor, Uncontrolled	None	None			J
			Air - Outdoor	None	None			J
		Cellular Glass	Air - Indoor, Uncontrolled	None	None			J
		Ceramic Fiber	Air - Indoor, Uncontrolled	None	None			J
		Fiberglass	Air - Indoor, Uncontrolled	None	None			J
			Air - Outdoor	None	None			J
		Fiberglass (Molded)	Air - Indoor, Uncontrolled	None	None			J
		Foamed Plastic (includes Rubatex)	Air - Indoor, Uncontrolled	None	None			J
			Air - Outdoor	None	None			J
		Insulation cement and finishing cement	Air - Indoor, Uncontrolled	None	None			J
			Air - Outdoor	None	None			J
		Min-K	Air - Indoor, Uncontrolled	None	None			J
		Mineral fiber	Air - Indoor, Uncontrolled	None	None			J
		NUKON	Air - Indoor, Uncontrolled	None	None			J

Table 3.5.2-10 Piping and Component Insulation 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	Stainless Steel (Mirror Insulation)	Air - Indoor, Uncontrolled	None	None	III.B4.TP-8	3.5.1-95	C
Insulation (support collars and fasteners)	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-43	3.5.1-92	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	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
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-6	3.5.1-93	C
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-43	3.5.1-92	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	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
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-6	3.5.1-93	C
Insulation jacketing (includes integral vapor barrier, wire mesh, tie wires, straps, bands, clamps, fasteners, breather springs)	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.2.1.35)	III.B4.TP-6	3.5.1-93	C
		Caulking and lagging adhesive	Air - Indoor, Uncontrolled	None	None			J
			Air - Outdoor	None	None			J

Table 3.5.2-10 Piping and Component Insulation Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Insulation jacketing (includes integral vapor barrier, wire mesh, tie wires, straps, bands, clamps, fasteners, breather springs)	Shelter, Protection	Fiberglass Cloth (includes silicone coated fiberglass cloth)	Air - Indoor, Uncontrolled	None	None			F
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B4.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-6	3.5.1-93	A
		Plastic mastic jacketing	Air - Indoor, Uncontrolled	None	None			J
			Air - Outdoor	None	None			J
		Stainless Steel	Air - Indoor, Uncontrolled	None	None	III.B4.TP-8	3.5.1-95	C
	Structural Support	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B4.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-6	3.5.1-93	C
		Fiberglass Cloth (includes silicone coated fiberglass cloth)	Air - Indoor, Uncontrolled	None	None			F
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B4.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-6	3.5.1-93	A
		Stainless Steel	Air - Indoor, Uncontrolled	None	None	III.B4.TP-8	3.5.1-95	C

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 3.5.2-11
Primary Containment
Summary of Aging Management Evaluation

Table 3.5.2-11 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 Boundary	Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.30)	II.B4.CP-148	3.5.1-31	A
				Loss of Preload	10 CFR Part 50, Appendix J (B.2.1.33)	II.B4.CP-150	3.5.1-30	A
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B4.CP-150	3.5.1-30	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.30)	II.B4.CP-148	3.5.1-31	A
				Loss of Preload	10 CFR Part 50, Appendix J (B.2.1.33)	II.B4.CP-150	3.5.1-30	A
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B4.CP-150	3.5.1-30	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Bolting (Structural)	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A4.TP-261	3.5.1-88	A
		Galvanized Bolting	Air - Indoor, Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.35)	III.A4.TP-261	3.5.1-88	A
Bolting (Vacuum Relief Valve Bolting)	Structural Pressure Boundary	Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.30)	II.B4.CP-148	3.5.1-31	A

Table 3.5.2-11 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting (Vacuum Relief Valve Bolting)	Structural Pressure Boundary	Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Preload	ASME Section XI, Subsection IWE (B.2.1.30)	II.B4.CP-150	3.5.1-30	A, 1
	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.30)	II.B4.CP-148	3.5.1-31	A
				Loss of Preload	ASME Section XI, Subsection IWE (B.2.1.30)	II.B4.CP-150	3.5.1-30	A, 1
Cable Trays and Gutters	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
Concrete Anchors	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-248	3.5.1-80	C
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A4.TP-261	3.5.1-88	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Concrete Embedments	Structural Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.30)	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.2.1.33)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.30)	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.2.1.33)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.CP-46	3.5.1-35	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C

Table 3.5.2-11 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 Support	Carbon Steel	Treated Water	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.30)	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.2.1.33)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.30)	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.2.1.33)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.CP-46	3.5.1-35	A
Concrete: Containment Wall (accessible areas)	Missile Barrier	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.31)	II.B2.2.CP-79	3.5.1-21	A
	Shelter, Protection	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.31)	II.B2.2.CP-79	3.5.1-21	A
	Shielding	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.31)	II.B2.2.CP-79	3.5.1-21	A
	Structural Pressure Boundary	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.31)	II.B2.2.CP-79	3.5.1-21	A
	Structural Support	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.31)	II.B2.2.CP-79	3.5.1-21	A
Concrete: Containment Wall (inaccessible areas)	Missile Barrier	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	II.B2.2.CP-80	3.5.1-22	A

Table 3.5.2-11 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)	Shelter, Protection	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	II.B2.2.CP-80	3.5.1-22	A
	Shielding	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	II.B2.2.CP-80	3.5.1-22	A
	Structural Pressure Boundary	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	II.B2.2.CP-80	3.5.1-22	A
	Structural Support	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	II.B2.2.CP-80	3.5.1-22	A
Concrete: Foundation (accessible): basemat	Flood Barrier	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.31)	II.B2.2.CP-79	3.5.1-21	A
	Shelter, Protection	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.31)	II.B2.2.CP-79	3.5.1-21	A
	Structural Pressure Boundary	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.31)	II.B2.2.CP-79	3.5.1-21	A
	Structural Support	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.31)	II.B2.2.CP-79	3.5.1-21	A
Concrete: Foundation (inaccessible): basemat	Flood Barrier	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	II.B2.2.CP-80	3.5.1-22	A
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-212	3.5.1-65	A

Table 3.5.2-11 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 (inaccessible): basemat	Flood Barrier	Reinforced concrete	Groundwater/Soil	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	II.A1.CP-100	3.5.1-24	A
	Shelter, Protection	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	II.B2.2.CP-80	3.5.1-22	A
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	II.A1.CP-100	3.5.1-24	A
	Structural Pressure Boundary	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	II.B2.2.CP-80	3.5.1-22	A
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	II.A1.CP-100	3.5.1-24	A
	Structural Support	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	II.B2.2.CP-80	3.5.1-22	A
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	II.A1.CP-100	3.5.1-24	A

Table 3.5.2-11 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 (Diaphragm Slab)	Missile Barrier	Reinforced concrete	Encased in Steel	None	ASME Section XI, Subsection IWL (B.2.1.31)			G, 2
	Structural Pressure Boundary	Reinforced concrete	Encased in Steel	None	ASME Section XI, Subsection IWL (B.2.1.31)			G, 2
	Structural Support	Reinforced concrete	Encased in Steel	None	ASME Section XI, Subsection IWL (B.2.1.31)			G, 2
Concrete: Interior (Pedestal)	Missile Barrier	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.31)	II.B2.2.CP-79	3.5.1-21	A
			Encased in Steel	None	ASME Section XI, Subsection IWL (B.2.1.31)			G, 2
	Structural Support	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	ASME Section XI, Subsection IWL (B.2.1.31)	II.B2.2.CP-79	3.5.1-21	A
			Encased in Steel	None	ASME Section XI, Subsection IWL (B.2.1.31)			G, 2
Conduit	Shelter, Protection	Galvanized 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	C
Doors (Reactor Shield Doors and Plugs)	Shielding	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-302	3.5.1-77	C
		Concrete	Encased in Steel	None	None			G, 2
Downcomer Jet Deflectors	Direct Flow	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.30)	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.2.1.30)	II.B2.2.CP-117	3.5.1-31	C
Electrical Penetration Assembly	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.CP-46	3.5.1-35	A

Table 3.5.2-11 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 Assembly	Shelter, Protection	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	10 CFR Part 50, Appendix J (B.2.1.33)	II.B4.CP-41	3.5.1-33	A, 3
		Stainless Steel	Air - Indoor, Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B2.2.C-49	3.5.1-37	C
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.C-49	3.5.1-37	C
	Structural Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.CP-46	3.5.1-35	A
		Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	10 CFR Part 50, Appendix J (B.2.1.33)	II.B4.CP-41	3.5.1-33	A, 3
		Stainless Steel	Air - Indoor, Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B2.2.C-49	3.5.1-37	C
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.C-49	3.5.1-37	C
Hatches/Plugs	Missile Barrier	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B4.C-16	3.5.1-28	C
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B4.C-16	3.5.1-28	C
	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B4.C-16	3.5.1-28	C
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B4.C-16	3.5.1-28	C
	Structural Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B4.C-16	3.5.1-28	C
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B4.C-16	3.5.1-28	C
Metal components: (Permanent Drywell Shielding)	Shielding	Lead	Air - Indoor, Uncontrolled	None	None			J, 4

Table 3.5.2-11 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Metal components: (Permanent Drywell Shielding)	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-302	3.5.1-77	C
		Fiberglass	Air - Indoor, Uncontrolled	None	None			J, 4
Metal components: All structural members	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-302	3.5.1-77	A
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	A
Miscellaneous steel (catwalks, stairs, handrails, ladders, platforms, etc.)	Structural Support	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	A
		Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-302	3.5.1-77	A
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	A
		Stainless Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	A
Panels, Racks, Cabinets, and Other Enclosures	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B3.TP-8	3.5.1-95	C
		Stainless Steel	Air - Indoor, Uncontrolled	None	None	III.B3.TP-8	3.5.1-95	C
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B3.TP-8	3.5.1-95	C
		Stainless Steel	Air - Indoor, Uncontrolled	None	None	III.B3.TP-8	3.5.1-95	C

Table 3.5.2-11 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: (includes caps for spares)	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	A, 5
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B4.CP-36	3.5.1-35	A, 6
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B4.CP-36	3.5.1-35	A, 6
			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, 5
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B2.2.C-49	3.5.1-37	C, 6
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.C-49	3.5.1-37	C, 6
		Carbon Steel; dissimilar metal welds	Air - Indoor, Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	A, 5
		Stainless Steel	Air - Indoor, Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	A, 5
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
	Structural Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	A, 5
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B4.CP-36	3.5.1-35	A, 6
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B4.CP-36	3.5.1-35	A, 6
			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, 5
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B2.2.C-49	3.5.1-37	C, 6

Table 3.5.2-11 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: (includes caps for spares)	Structural Pressure Boundary	Carbon Steel	Treated Water	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.C-49	3.5.1-37	C, 6
		Carbon Steel; dissimilar metal welds	Air - Indoor, Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	A, 5
		Stainless Steel	Air - Indoor, Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	A, 5
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	A, 5
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B4.CP-36	3.5.1-35	A, 6
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B4.CP-36	3.5.1-35	A, 6
			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, 5
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B2.2.C-49	3.5.1-37	C, 6
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.C-49	3.5.1-37	C, 6
		Carbon Steel; dissimilar metal welds	Air - Indoor, Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	A, 5
		Stainless Steel	Air - Indoor, Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	A, 5
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Personnel airlock, equipment hatch, CRD hatch	Missile Barrier	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B4.C-16	3.5.1-28	A
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B4.C-16	3.5.1-28	A

Table 3.5.2-11 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.2.1.33)	II.B4.C-16	3.5.1-28	A
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B4.C-16	3.5.1-28	A
	Structural Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B4.C-16	3.5.1-28	A
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B4.C-16	3.5.1-28	A
Personnel airlock, equipment hatch, CRD hatch: Locks, hinges, and closure mechanisms	Structural Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Leaktightness	10 CFR Part 50, Appendix J (B.2.1.33)	II.B4.CP-39	3.5.1-29	A
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B4.CP-39	3.5.1-29	A
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Leaktightness	10 CFR Part 50, Appendix J (B.2.1.33)	II.B4.CP-39	3.5.1-29	A
					ASME Section XI, Subsection IWE (B.2.1.30)	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.2.1.35)	III.A4.TP-302	3.5.1-77	C
	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-302	3.5.1-77	C
Seals and gaskets	Structural Pressure Boundary	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	10 CFR Part 50, Appendix J (B.2.1.33)	II.B4.CP-41	3.5.1-33	A
Seismic Gap Filler	Expansion/ Separation	Elastomer	Air - Indoor, Uncontrolled	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring (B.2.1.35)	VII.G.A-19	3.3.1-57	E, 7

Table 3.5.2-11 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	Maintain Adhesion	Coatings	Air - Indoor, Uncontrolled	Loss of Coating Integrity	Protective Coating Monitoring and Maintenance Program (B.2.1.37)	II.B4.CP-152	3.5.1-34	A
			Treated Water	Loss of Coating Integrity	Protective Coating Monitoring and Maintenance Program (B.2.1.37)			G
Sliding (support) surfaces	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-302	3.5.1-77	A, 8
Steel Components (Energy Absorbers)	Pipe Whip Restraint	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.2.1.35)	III.A4.TP-302	3.5.1-77	C
		Stainless Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
Steel Components (RPV Stabilizer)	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.1.T-24	3.5.1-91	C
Steel Components (RPV Transfer Girder and Reactor Shield Transfer Girder)	Structural Support	Carbon Steel	Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Steel Components (Reactor Shield)	Missile Barrier	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-302	3.5.1-77	C
	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-302	3.5.1-77	C
	Shielding	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-302	3.5.1-77	C
		Concrete	Encased in Steel	None	None			G, 2
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-302	3.5.1-77	C
Steel Components (Seismic Stabilizer)	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-302	3.5.1-77	C

Table 3.5.2-11 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Steel Components (Steel Columns in Suppression Pool)	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.3.TP-226	3.5.1-81	C
			Treated Water	Loss of Material	ASME Section XI, Subsection IWF (B.2.1.32)	III.B1.1.TP-10	3.5.1-90	C
					Water Chemistry (B.2.1.2)	III.B1.1.TP-10	3.5.1-90	C
Steel elements: diaphragm slab liner, liner anchors, integral attachments	Direct Flow	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.CP-117	3.5.1-31	C
Steel elements: (Refueling Bellows Assembly)	Flood Barrier	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-302	3.5.1-77	C, 9
		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
			Treated Water	Loss of Material	Water Chemistry (B.2.1.2)	III.A5.T-14	3.5.1-78	C
	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-302	3.5.1-77	C, 9
		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
			Treated Water	Loss of Material	Water Chemistry (B.2.1.2)	III.A5.T-14	3.5.1-78	C
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-302	3.5.1-77	C, 9
		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
			Treated Water	Loss of Material	Water Chemistry (B.2.1.2)	III.A5.T-14	3.5.1-78	C
	Water retaining boundary	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-302	3.5.1-77	C, 9

Table 3.5.2-11 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)	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
			Treated Water	Loss of Material	Water Chemistry (B.2.1.2)	III.A5.T-14	3.5.1-78	C
Steel elements: (Seal Plate)	Flood Barrier	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-302	3.5.1-77	C, 9
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-302	3.5.1-77	C, 9
	Water retaining boundary	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-302	3.5.1-77	C, 9
Steel elements: (debris screens, grating and bars)	Filter	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
		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	C
Steel elements: Downcomers and Bracing	Direct Flow	Carbon Steel	Air - Indoor, Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B2.2.C-48	3.5.1-9	A. 5
				Loss of Material	ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.CP-117	3.5.1-31	A
			Treated Water	Cumulative Fatigue Damage	TLAA	II.B2.2.C-48	3.5.1-9	A, 5
				Loss of Material	ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.CP-117	3.5.1-31	A
Steel elements: Vacuum Breaker Valves and Piping (Connected to Downcomer)	Pressure Relief	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.CP-117	3.5.1-31	C

Table 3.5.2-11 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 (drywell and suppression chamber accessible areas)	Structural Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	C, 5
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.30)	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	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	C, 5
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.CP-46	3.5.1-35	A
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	C, 5
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.30)	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	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	C, 5
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.CP-46	3.5.1-35	A

Table 3.5.2-11 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 (drywell and suppression chamber accessible areas)	Water retaining boundary	Carbon Steel	Air - Indoor, Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	C, 5
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.30)	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	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	C, 5
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.CP-46	3.5.1-35	A
		Stainless Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C, 10
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C, 10
Steel elements: liner, liner anchors, integral attachments (drywell and suppression chamber inaccessible areas)	Structural Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	C, 5
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B2.2.CP-63	3.5.1-5	A
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.CP-63	3.5.1-5	A

Table 3.5.2-11 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 (drywell and suppression chamber inaccessible areas)	Structural Pressure Boundary	Carbon Steel	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	C, 5
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B2.2.CP-63	3.5.1-5	A
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.CP-63	3.5.1-5	A
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	C, 5
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B2.2.CP-63	3.5.1-5	A
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.CP-63	3.5.1-5	A
			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	C, 5
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B2.2.CP-63	3.5.1-5	A
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.CP-63	3.5.1-5	A
	Water retaining boundary	Carbon Steel	Air - Indoor, Uncontrolled	Cumulative Fatigue Damage	TLAA	II.B4.C-13	3.5.1-9	C, 5
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B2.2.CP-63	3.5.1-5	A
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.CP-63	3.5.1-5	A

Table 3.5.2-11 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 (drywell and suppression chamber inaccessible areas)	Water retaining boundary	Carbon Steel	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	C, 5
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B2.2.CP-63	3.5.1-5	A
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.CP-63	3.5.1-5	A
		Stainless Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C, 10
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C, 10
Steel elements:(Drywell Head)	Missile Barrier	Carbon Steel	Air - Indoor, Uncontrolled	Fretting or Lock-up	ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.C-23	3.5.1-36	A
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.CP-46	3.5.1-35	A
	Shielding	Carbon Steel	Air - Indoor, Uncontrolled	Fretting or Lock-up	ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.C-23	3.5.1-36	A
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B2.2.CP-46	3.5.1-35	A
					ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.CP-46	3.5.1-35	A
	Structural Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled	Fretting or Lock-up	ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.C-23	3.5.1-36	A
				Loss of Material	10 CFR Part 50, Appendix J (B.2.1.33)	II.B2.2.CP-46	3.5.1-35	A

Table 3.5.2-11 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 Head)	Structural Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	ASME Section XI, Subsection IWE (B.2.1.30)	II.B2.2.CP-46	3.5.1-35	A
Tube Track	Shelter, Protection	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	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	C
		Stainless Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C

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 ASME Section XI, Subsection IWE (B.2.1.30) program is the applicable aging management program for this component. Appendix J testing is not applicable to vacuum relief valves or downcomer attached piping.

2. Concrete or Concrete (High Density) or Grout (High Density) or Boron Concrete encased in steel is protected from environments that promote age related degradations. Concrete encased in steel has no aging effects.

3. The 10 CFR Part 50, Appendix J (B.2.1.33) program is the applicable aging management program for this component. The Primary Containment electrical penetration assemblies including internal elastomer seals are subject to individual Local Leak Rate Testing (LLRT) per 10CFR50, Appendix J, Option B. These are hermetically sealed Conax type penetration assemblies.

4. Lead shielding and fiberglass cloth have no applicable aging effects requiring management.

5. The TLAA designation in the Aging Management Program column indicates fatigue of this component is evaluated in Sections 4.5 and 4.6.

6. The process line penetrations are of welded steel construction without expansion bellows, gaskets or sealing compounds. Containment piping and mechanical penetrations do not contain thermal insulation.

7. The Structures Monitoring (B.2.1.35) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination.

8. Sliding radial beam supports and other supports, including pinned connections for radial beams, are carbon steel, there is no lubrite or other material involved.

9. 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.

10. A section of stainless steel liner exists at the top of the containment concrete outside of the containment head. It is not containment pressure boundary, but is a water retaining boundary during refueling operations.

Table 3.5.2-12
Radwaste Enclosure
Summary of Aging Management Evaluation

Table 3.5.2-12 Radwaste Enclosure

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.2.1.35)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
		Galvanized Bolting	Air - Indoor, Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
				None	None	III.B3.TP-8	3.5.1-95	C
Cable Trays and Gutters	Structural Support	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
Concrete Anchors	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-24	3.5.1-63	A

Table 3.5.2-12 Radwaste Enclosure (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.2.1.35)	III.A3.TP-302	3.5.1-77	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	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.B5.TP-8	3.5.1-95	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Concrete: Above-grade exterior (accessible)	Shelter, Protection	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-24	3.5.1-63	A
	Shielding	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-24	3.5.1-63	A
	Structural Support	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-24	3.5.1-63	A

Table 3.5.2-12 Radwaste Enclosure (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)	Shelter, Protection	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-108	3.5.1-42	A
Concrete: Below-grade exterior (inaccessible)	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-67	3.5.1-47	A

Table 3.5.2-12 Radwaste Enclosure (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)	Water retaining boundary	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-67	3.5.1-47	A
Concrete: Foundation (inaccessible)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-212	3.5.1-65	A

Table 3.5.2-12 Radwaste Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation (inaccessible)	Structural Support	Reinforced concrete	Groundwater/Soil	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
	Shielding	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
	Structural Support	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
	Water retaining boundary	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
Conduit	Shelter, Protection	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
	Structural Support	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C

Table 3.5.2-12 Radwaste Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Conduit	Structural Support	Galvanized Steel	Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Doors	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
	Shielding	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
Equipment supports and foundations	Structural Support	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
Hatches/Plugs	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
	Shielding	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A

Table 3.5.2-12 Radwaste Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Hatches/Plugs	Shielding	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
Masonry walls: Interior	Shelter, Protection	Concrete Block	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.34)	III.A3.T-12	3.5.1-70	A
	Shielding	Concrete Block	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.34)	III.A3.T-12	3.5.1-70	A
	Structural Support	Concrete Block	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.34)	III.A3.T-12	3.5.1-70	A
Metal components: All structural members	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A

Table 3.5.2-12 Radwaste Enclosure (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, vents and louvers, platforms, etc.)	Filter	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
	Shelter, Protection	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
		Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	A
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	A
Panels, Racks, Cabinets, and Other Enclosures	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B3.TP-8	3.5.1-95	C
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B3.TP-8	3.5.1-95	C
Penetration seals	Shelter, Protection	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A

Table 3.5.2-12 Radwaste Enclosure (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	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A, 1
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A, 1
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A, 1
	Shielding	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A, 1
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A, 1
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A, 1
		Lead	Air - Indoor, Uncontrolled	None	None			F
	Water retaining boundary	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A, 1
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A, 1
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A, 1

Table 3.5.2-12 Radwaste Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Penetration sleeves	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			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
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			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
	Water retaining boundary	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			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
Roofing	Shelter, Protection	Elastomer	Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
		Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	C
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	C
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Shelter, Protection	Aluminum	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
		Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A

Table 3.5.2-12 Radwaste Enclosure (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)	Shelter, Protection	Elastomer	Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
	Water retaining boundary	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
Seismic Gap Filler	Expansion/ Separation	Elastomer	Air - Indoor, Uncontrolled	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring (B.2.1.35)	VII.G.A-19	3.3.1-57	E, 2
			Air - Outdoor	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring (B.2.1.35)	VII.G.A-20	3.3.1-57	E, 2
Steel elements: liner (sump), integral attachments	Water retaining boundary	Stainless 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
			Raw Water	Loss of Material	Structures Monitoring (B.2.1.35)	VII.H2.AP-55	3.3.1-41	E, 2
Tube Track	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C

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. NUREG-1801 does not contain grout penetration seals, however cracking, loss of bond, and loss of material are applicable aging effects for both grout and concrete, and are managed for grout penetration seals by the Structures Monitoring (B.2.1.35) program.

2. The Structures Monitoring (B.2.1.35) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.5.2-13
Reactor Enclosure
Summary of Aging Management Evaluation

Table 3.5.2-13 Reactor Enclosure

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Blowout Panels	Pressure Relief	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A1.TP-302	3.5.1-77	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.2.1.35)	III.A1.TP-302	3.5.1-77	C
Bolting (Structural)	Structural Support	Aluminum	Air - Indoor, Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.35)	III.A1.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A1.TP-261	3.5.1-88	A
		Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A1.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A1.TP-261	3.5.1-88	A
		Galvanized Bolting	Air - Indoor, Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.35)	III.A1.TP-261	3.5.1-88	A

Table 3.5.2-13 Reactor Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting (Structural)	Structural Support	Galvanized Bolting	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A1.TP-261	3.5.1-88	A
		Stainless Steel Bolting	Air - Indoor, Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.35)	III.A1.TP-261	3.5.1-88	A
				None	None	III.B5.TP-8	3.5.1-95	C
Cable Trays and Gutters	Structural Support	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
		Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
Compressible Joints and Seals (includes Inflatable Pool Seals and Gate Seals)	Water retaining boundary	Elastomer	Air - Indoor, Uncontrolled	Hardening and Loss of Strength	Structures Monitoring (B.2.1.35)	VII.F3.AP-102	3.3.1-76	E, 1
				Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Treated Water	Hardening and Loss of Strength	Structures Monitoring (B.2.1.35)	VII.A4.AP-101	3.3.1-86	E, 1
Concrete Anchors	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A1.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A1.TP-261	3.5.1-88	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C

Table 3.5.2-13 Reactor Enclosure (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.2.1.35)	III.A1.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.TP-23	3.5.1-64	A
Concrete Embedments	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.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
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.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)	Flood Barrier	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A1.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A

Table 3.5.2-13 Reactor Enclosure (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)	Missile Barrier	Reinforced concrete	Air - Outdoor	Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A1.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A1.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.TP-23	3.5.1-64	A
	Structural Pressure Boundary	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A1.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A

Table 3.5.2-13 Reactor Enclosure (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)	Structural Support	Reinforced concrete	Air - Outdoor	Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.TP-23	3.5.1-64	A
Concrete: Above-grade exterior (inaccessible)	Flood Barrier	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A6.TP-104	3.5.1-65	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A6.TP-104	3.5.1-65	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A6.TP-104	3.5.1-65	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A

Table 3.5.2-13 Reactor Enclosure (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)	Shielding	Reinforced concrete	Air - Outdoor	Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.TP-108	3.5.1-42	A
	Structural Pressure Boundary	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A6.TP-104	3.5.1-65	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.TP-108	3.5.1-42	A
Concrete: Below-grade exterior (accessible)	Flood Barrier	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
	Missile Barrier	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
	Shelter, Protection	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
	Shielding	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
	Structural Pressure Boundary	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A

Table 3.5.2-13 Reactor Enclosure (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)	Structural Support	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
Concrete: Below-grade exterior (inaccessible)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A1.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A1.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A1.TP-67	3.5.1-47	A

Table 3.5.2-13 Reactor Enclosure (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)	Shielding	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A1.TP-67	3.5.1-47	A
	Structural Pressure Boundary	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A1.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A1.TP-67	3.5.1-47	A
Concrete: Foundation (inaccessible)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-212	3.5.1-65	A

Table 3.5.2-13 Reactor Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation (inaccessible)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A1.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A1.TP-67	3.5.1-47	A
	Structural Pressure Boundary	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A1.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-29	3.5.1-67	A

Table 3.5.2-13 Reactor Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation (inaccessible)	Structural Support	Reinforced concrete	Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A1.TP-26	3.5.1-66	A
	HELB/MELB Shielding	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
	Missile Barrier	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
	Shelter, Protection	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
	Shielding	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
	Structural Pressure Boundary	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
	Structural Support	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
Conduit	Shelter, Protection	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
	Structural Support	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C

Table 3.5.2-13 Reactor Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Doors	Flood Barrier	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
	HELB/MELB Shielding	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
	Missile Barrier	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
	Structural Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
Equipment supports and foundations	Structural Support	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	C
Hatches/Plugs	Flood Barrier	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
	HELB/MELB Shielding	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
	Missile Barrier	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
	Shelter, Protection	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A

Table 3.5.2-13 Reactor Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Hatches/Plugs	Shielding	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
	Structural Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.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.2.1.35)	III.A1.TP-26	3.5.1-66	A
Masonry walls: Interior	Missile Barrier	Concrete Block	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.34)	III.A1.T-12	3.5.1-70	A
	Shelter, Protection	Concrete Block	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.34)	III.A1.T-12	3.5.1-70	A
	Shielding	Concrete Block	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.34)	III.A1.T-12	3.5.1-70	A
	Structural Support	Concrete Block	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.34)	III.A1.T-12	3.5.1-70	A
Metal components: All structural members	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.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 Reactor Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Metal components: All structural members	Structural Support	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
Metal panels	Shelter, Protection	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
	Structural Support	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
Miscellaneous steel (catwalks, stairs, handrails, ladders, vents and louvers, platforms, etc.)	Shelter, Protection	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	A
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	A
Panels, Racks, Cabinets, and Other Enclosures	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C

Table 3.5.2-13 Reactor Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Panels, Racks, Cabinets, and Other Enclosures	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
Penetration seals	Flood Barrier	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A1.TP-26	3.5.1-66	A, 2
	HELB/MELB Shielding	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A1.TP-26	3.5.1-66	A, 2
	Shelter, Protection	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A1.TP-26	3.5.1-66	A, 2
	Shielding	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A1.TP-26	3.5.1-66	A, 2
	Structural Pressure Boundary	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A1.TP-26	3.5.1-66	A, 2
Penetration sleeves	Flood Barrier	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C

Table 3.5.2-13 Reactor Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Penetration sleeves	Flood Barrier	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
	HELB/MELB Shielding	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
			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
	Structural Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
			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
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
			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
Pipe Whip Restraints and Jet Impingement Shields	HELB/MELB Shielding	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
	Pipe Whip Restraint	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
Precast Panel	Shelter, Protection	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	C
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.TP-23	3.5.1-64	C

Table 3.5.2-13 Reactor Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Precast Panel	Shelter, Protection	Reinforced concrete	Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A1.TP-24	3.5.1-63	C
Roofing	Missile Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.TP-23	3.5.1-64	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A1.TP-24	3.5.1-63	A
	Shelter, Protection	Elastomer	Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
		Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.TP-23	3.5.1-64	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A1.TP-24	3.5.1-63	A
	Structural Pressure Boundary	Elastomer	Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
		Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.TP-23	3.5.1-64	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A1.TP-24	3.5.1-63	A
	Structural Support	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A1.TP-26	3.5.1-66	A

Table 3.5.2-13 Reactor Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Roofing	Structural Support	Reinforced concrete	Air - Outdoor	Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A1.TP-23	3.5.1-64	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A1.TP-24	3.5.1-63	A
Roofing: (Scuppers)	Direct Flow	Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Flood Barrier	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
	HELB/MELB Shielding	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
	Shelter, Protection	Aluminum	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
		Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
		Stainless Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
	Structural Pressure Boundary	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
Seismic Gap Filler	Expansion/ Separation	Elastomer	Air - Indoor, Uncontrolled	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring (B.2.1.35)	VII.G.A-19	3.3.1-57	E, 1

Table 3.5.2-13 Reactor Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Seismic Gap Filler	Expansion/ Separation	Elastomer	Air - Outdoor	Increased Hardness, Shrinkage, and Loss of Strength	Structures Monitoring (B.2.1.35)	VII.G.A-20	3.3.1-57	E, 1
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	A, 3
Steel elements: (birdscreen)	Filter	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
Steel elements: Fuel pool liners, 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	A, 3
Steel elements: Reactor Well, Dryer and Separator Pool, and Cask Loading Pit liners, 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	A, 4
Steel elements: Sump liners, integral attachments	Water retaining boundary	Stainless Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C

Table 3.5.2-13 Reactor Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Steel elements: Sump liners, integral attachments	Water retaining boundary	Stainless Steel	Concrete	None	None	VII.J.AP-19	3.3.1-120	C
			Raw Water	Loss of Material	Structures Monitoring (B.2.1.35)	VII.H2.AP-55	3.3.1-41	E, 1
Tube Track	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C

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 Structures Monitoring (B.2.1.35) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination.

2. NUREG-1801 does not contain grout penetration seals, however cracking, loss of bond, and loss of material are applicable aging effects for both grout and concrete, and are managed for grout penetration seals by the Structures Monitoring (B.2.1.35) program.

3. 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.

4. The Reactor Well water level is monitored in accordance with technical specifications.

Table 3.5.2-14
Service Water Pipe Tunnel
Summary of Aging Management Evaluation

Table 3.5.2-14 Service Water Pipe Tunnel

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.2.1.35)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
		Galvanized Bolting	Air - Indoor, Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
				None	None	III.B5.TP-8	3.5.1-95	A
Cable Trays and Gutters	Structural Support	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
Concrete Anchors	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
Concrete Embedments	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	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
Concrete: Above-grade exterior (accessible)	Flood Barrier	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A

Table 3.5.2-14 Service Water Pipe Tunnel (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)	Flood Barrier	Reinforced concrete	Air - Outdoor	Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
Concrete: Below-grade exterior (inaccessible)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A

Table 3.5.2-14 Service Water Pipe Tunnel (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)	Flood Barrier	Reinforced concrete	Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-67	3.5.1-47	A

Table 3.5.2-14 Service Water Pipe Tunnel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation (inaccessible)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A

Table 3.5.2-14 Service Water Pipe Tunnel (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	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
	Shelter, Protection	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
	Structural Support	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
Conduit	Shelter, Protection	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
	Structural Support	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
Doors	Flood Barrier	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
	Structural Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
Hatches/Plugs	Flood Barrier	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C

Table 3.5.2-14 Service Water Pipe Tunnel (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	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
Metal components: All structural members	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
Miscellaneous steel (catwalks, stairs, handrails, ladders, vents and louvers, platforms, etc.)	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	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
Panels, Racks, Cabinets, and Other Enclosures	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B3.TP-8	3.5.1-95	C
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
		Galvanized 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.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A, 1
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A, 1
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A, 1

Table 3.5.2-14 Service Water Pipe Tunnel (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	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A, 1
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A, 1
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A, 1
Penetration sleeves	Flood Barrier	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			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
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			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
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Flood Barrier	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
	Shelter, Protection	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A

Table 3.5.2-14 Service Water Pipe Tunnel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Seismic Gap Filler	Expansion/ Separation	Elastomer	Air - Indoor, Uncontrolled	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring (B.2.1.35)	VII.G.A-19	3.3.1-57	E, 2
			Air - Outdoor	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring (B.2.1.35)	VII.G.A-20	3.3.1-57	E, 2
Tube Track	Shelter, Protection	Galvanized 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	C

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. NUREG-1801 does not contain grout penetration seals, however cracking, loss of bond and 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.2.1.35) program.

2. The Structures Monitoring (B.2.1.35) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.5.2-15
Spray Pond and Pump House
Summary of Aging Management Evaluation

Table 3.5.2-15 Spray Pond and Pump 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.2.1.35)	III.A6.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A6.TP-261	3.5.1-88	A
		Galvanized Bolting	Air - Indoor, Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.35)	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.2.1.36)	III.A6.TP-221	3.5.1-83	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A6.TP-261	3.5.1-88	A
			Water - Standing	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-221	3.5.1-83	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A6.TP-261	3.5.1-88	A
		Stainless Steel Bolting	Air - Indoor, Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.35)	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.2.1.36)	III.B2.TP-6	3.5.1-93	E, 1
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A6.TP-261	3.5.1-88	A

Table 3.5.2-15 Spray Pond and Pump House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting (Structural)	Structural Support	Stainless Steel Bolting	Raw Water	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	VII.H2.AP-55	3.3.1-41	E, 1
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A6.TP-261	3.5.1-88	A
Cable Trays and Gutters	Structural Support	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
Concrete (Concrete Pipe Encasement)	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.2.1.36)	III.A6.TP-38	3.5.1-59	A
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-36	3.5.1-60	A
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-38	3.5.1-59	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.2.1.36)			H, 2
				Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	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.2.1.36)	III.A6.TP-38	3.5.1-59	A

Table 3.5.2-15 Spray Pond and Pump House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete (Concrete Pipe Encasement)	Structural Support	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.2.1.36)	III.A6.TP-36	3.5.1-60	A
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-38	3.5.1-59	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.2.1.36)			H, 2
				Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-37	3.5.1-61	A
Concrete Anchors	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A6.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	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.2.1.36)	III.A6.TP-221	3.5.1-83	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A6.TP-261	3.5.1-88	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
		Stainless Steel Bolting	Air - Indoor, Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.35)	III.A6.TP-261	3.5.1-88	A
				None	None	III.B2.TP-8	3.5.1-95	A
			Air - Outdoor	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.B2.TP-6	3.5.1-93	E, 1

Table 3.5.2-15 Spray Pond and Pump 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 Preload	Structures Monitoring (B.2.1.35)	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.2.1.36)	VII.H2.AP-55	3.3.1-41	E, 1
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A6.TP-261	3.5.1-88	A
Concrete Embedments	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
			Raw Water	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	VII.G.A-33	3.3.1-64	E, 1
		Stainless Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-6	3.5.1-93	C
			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.2.1.36)	VII.H2.AP-55	3.3.1-41	E, 1

Table 3.5.2-15 Spray Pond and Pump House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete Embedments (Sluice Gate Wall Thimble)	Structural Support	Ductile Cast Iron	Air - Outdoor	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-221	3.5.1-83	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
			Raw Water	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	VII.G.A-33	3.3.1-64	E, 1
	Water retaining boundary	Ductile Cast Iron	Air - Outdoor	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-221	3.5.1-83	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
			Raw Water	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	VII.G.A-33	3.3.1-64	E, 1
Concrete: (Intake Area Slab)	Direct Flow	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-38	3.5.1-59	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.2.1.36)			H, 2
				Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-37	3.5.1-61	A
	Water retaining boundary	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-38	3.5.1-59	A

Table 3.5.2-15 Spray Pond and Pump House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: (Intake Area Slab)	Water retaining boundary	Reinforced concrete	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.2.1.36)			H, 2
				Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	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.2.1.36)	III.A6.T-20	3.5.1-56	A
Concrete: (Overflow 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.2.1.36)	III.A6.TP-38	3.5.1-59	A
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-36	3.5.1-60	A
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-38	3.5.1-59	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.2.1.36)			H, 2
				Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	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.2.1.36)	III.A6.TP-38	3.5.1-59	A

Table 3.5.2-15 Spray Pond and Pump House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: (Overflow Structure)	Structural Support	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.2.1.36)	III.A6.TP-36	3.5.1-60	A
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-38	3.5.1-59	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.2.1.36)			H, 2
				Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-37	3.5.1-61	A
	Water retaining boundary	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.2.1.36)	III.A6.TP-38	3.5.1-59	A
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-36	3.5.1-60	A
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-38	3.5.1-59	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.2.1.36)			H, 2
				Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-37	3.5.1-61	A

Table 3.5.2-15 Spray Pond and Pump 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)	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.2.1.36)	III.A6.TP-38	3.5.1-59	A
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-36	3.5.1-60	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.2.1.36)	III.A6.TP-38	3.5.1-59	A
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-36	3.5.1-60	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.2.1.36)	III.A6.TP-38	3.5.1-59	A
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-36	3.5.1-60	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.2.1.36)	III.A6.TP-38	3.5.1-59	A
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-36	3.5.1-60	A
Concrete: Above-grade exterior (inaccessible)	Flood Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A

Table 3.5.2-15 Spray Pond and Pump 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)	Flood 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.2.1.36)	III.A6.TP-110	3.5.1-49	A
	Missile Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-110	3.5.1-49	A
	Shelter, Protection	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-110	3.5.1-49	A
	Structural Support	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-110	3.5.1-49	A
Concrete: Below-grade exterior (inaccessible)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	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.2.1.36)			H, 2

Table 3.5.2-15 Spray Pond and Pump 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)	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.2.1.36)	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.2.1.35)	III.A6.TP-104	3.5.1-65	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.2.1.36)			H, 2
				Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	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.2.1.35)	III.A6.TP-104	3.5.1-65	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.2.1.36)			H, 2
				Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-109	3.5.1-51	A
	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	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.2.1.36)			H, 2

Table 3.5.2-15 Spray Pond and Pump 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)	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.2.1.36)	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.2.1.35)	III.A6.TP-104	3.5.1-65	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.2.1.36)			H, 2
				Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-109	3.5.1-51	A
Concrete: Columns (Spray Network Supports)	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.2.1.36)	III.A6.TP-38	3.5.1-59	A
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-36	3.5.1-60	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.2.1.36)			H, 2
				Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-37	3.5.1-61	A
Concrete: Foundation (accessible)	Flood 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.2.1.36)	III.A6.TP-38	3.5.1-59	A

Table 3.5.2-15 Spray Pond and Pump House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation (accessible)	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.2.1.36)	III.A6.TP-38	3.5.1-59	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.2.1.36)	III.A6.TP-38	3.5.1-59	A
	Water retaining boundary	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.2.1.36)	III.A6.TP-38	3.5.1-59	A
Concrete: Foundation (inaccessible)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	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.2.1.36)			H, 2
				Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	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.2.1.35)	III.A6.TP-104	3.5.1-65	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.2.1.36)			H, 2
				Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-109	3.5.1-51	A

Table 3.5.2-15 Spray Pond and Pump House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation (inaccessible)	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	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.2.1.36)			H, 2
				Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	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.2.1.35)	III.A6.TP-104	3.5.1-65	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.2.1.36)			H, 2
				Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-109	3.5.1-51	A
Concrete: Foundation (inaccessible) (Spray Network Supports)	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	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.2.1.36)			H, 2
				Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-109	3.5.1-51	A

Table 3.5.2-15 Spray Pond and Pump House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Interior	Flood 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.2.1.36)	III.A6.TP-38	3.5.1-59	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.2.1.36)			H, 2
				Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	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.2.1.36)	III.A6.T-20	3.5.1-56	A
	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.2.1.36)	III.A6.TP-38	3.5.1-59	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.2.1.36)			H, 2
				Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	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.2.1.36)	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.2.1.36)	III.A6.TP-38	3.5.1-59	A

Table 3.5.2-15 Spray Pond and Pump House (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	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.2.1.36)			H, 2
				Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	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.2.1.36)	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.2.1.36)	III.A6.TP-38	3.5.1-59	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.2.1.36)			H, 2
				Increase in Porosity and Permeability, Loss of Strength	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	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.2.1.36)	III.A6.T-20	3.5.1-56	A
	Water retaining boundary	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.2.1.36)	III.A6.TP-38	3.5.1-59	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.2.1.36)			H, 2

Table 3.5.2-15 Spray Pond and Pump House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Interior	Water retaining boundary	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.2.1.36)	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.2.1.36)	III.A6.T-20	3.5.1-56	A
Conduit	Shelter, Protection	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
	Structural Support	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
Doors	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
Earthen water-control structures: (Emergency Spillway)	Water retaining boundary	Soil, rip-rap, sand, gravel	Air - Outdoor	Loss of Material, Loss of Form	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)			G, 2
			Water - Flowing	Loss of Material, Loss of Form	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.T-22	3.5.1-58	A
			Water - Standing	Loss of Material, Loss of Form	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.T-22	3.5.1-58	A

Table 3.5.2-15 Spray Pond and Pump House (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: Embankments (dikes, include rock covered with shotcrete)	Water retaining boundary	Soil, rip-rap, sand, gravel	Air - Outdoor	Loss of Material, Loss of Form	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)			G, 2
			Water - Flowing	Loss of Material, Loss of Form	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.T-22	3.5.1-58	A
			Water - Standing	Loss of Material, Loss of Form	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.T-22	3.5.1-58	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.2.1.36)	III.A6.TP-38	3.5.1-59	A
Hatches/Plugs	Missile Barrier	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
		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.2.1.36)	III.A6.TP-38	3.5.1-59	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.2.1.36)	III.A6.TP-38	3.5.1-59	A
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-36	3.5.1-60	A

Table 3.5.2-15 Spray Pond and Pump House (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	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
		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.2.1.36)	III.A6.TP-38	3.5.1-59	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.2.1.36)	III.A6.TP-38	3.5.1-59	A
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-36	3.5.1-60	A
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
		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.2.1.36)	III.A6.TP-38	3.5.1-59	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.2.1.36)	III.A6.TP-38	3.5.1-59	A
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-36	3.5.1-60	A

Table 3.5.2-15 Spray Pond and Pump House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Metal components: (Removable Screens and Screen Frames)	Filter	Stainless Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.B2.TP-6	3.5.1-93	E, 1
			Raw Water	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	V.C.E-34	3.2.1-25	E, 1
Metal components: All structural members	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
Metal components: Weir Plate	Water retaining boundary	Stainless Steel	Air - Outdoor	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.B2.TP-6	3.5.1-93	E, 1
			Raw Water	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	V.C.E-34	3.2.1-25	E, 1
Miscellaneous steel (Splitter Assembly - vortex suppressors)	Direct Flow	Stainless Steel	Raw Water	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	V.C.E-34	3.2.1-25	E, 1
Miscellaneous steel (catwalks, stairs, handrails, ladders, vents and louvers, platforms, etc.)	Filter	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A

Table 3.5.2-15 Spray Pond and Pump House (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, vents and louvers, platforms, etc.)	Shelter, Protection	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
		Stainless Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	A
			Raw Water	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	V.C.E-34	3.2.1-25	E, 1
Panels, Racks, Cabinets, and Other Enclosures	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	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
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	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
Penetration seals	Flood Barrier	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A

Table 3.5.2-15 Spray Pond and Pump House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Penetration seals	Flood Barrier	Grout	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.2.1.36)	III.A6.TP-38	3.5.1-59	A, 3
			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.2.1.36)	III.A6.TP-38	3.5.1-59	A, 3
				Loss of Material (Spalling, Scaling) and Cracking	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-36	3.5.1-60	A, 3
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.TP-38	3.5.1-59	A, 3
				Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A6.TP-107	3.5.1-67	A, 3
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A6.TP-109	3.5.1-51	A, 3
Penetration sleeves	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Roofing	Shelter, Protection	Elastomer	Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
Roofing: (Scuppers)	Shelter, Protection	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C

Table 3.5.2-15 Spray Pond and Pump House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Roofing: (Scuppers)	Shelter, Protection	Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Shelter, Protection	Aluminum	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
		Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
	Water retaining boundary	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Groundwater/Soil	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Raw Water	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
Seismic Gap Filler	Expansion/ Separation	Elastomer	Air - Indoor, Uncontrolled	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring (B.2.1.35)	VII.G.A-19	3.3.1-57	E, 4
			Air - Outdoor	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring (B.2.1.35)	VII.G.A-20	3.3.1-57	E, 4
Tube Track	Shelter, Protection	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
	Structural Support	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C

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.2.1.36) 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.2.1.36) program will be used to manage the aging effect(s) applicable to this component type, material, and environment combination.

3. NUREG-1801 does not contain grout penetration seals, however cracking, loss of bond and 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.2.1.35) and RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36) programs.

4. The Structures Monitoring (B.2.1.35) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination.

Table 3.5.2-16
Turbine Enclosure
Summary of Aging Management Evaluation

Table 3.5.2-16 Turbine Enclosure

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Blowout Panels	Pressure Relief	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
		Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
Bolting (Structural)	Structural Support	Aluminum	Air - Indoor, Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
		Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
		Galvanized Steel	Air - Indoor, Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
Cable Trays and Gutters	Structural Support	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C

Table 3.5.2-16 Turbine Enclosure (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.2.1.35)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
Concrete Embedments	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	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
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	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)	Flood Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A

Table 3.5.2-16 Turbine Enclosure (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)	Structural Support	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
Concrete: Above-grade exterior (inaccessible)	Flood Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-108	3.5.1-42	A
Concrete: Below-grade exterior (inaccessible)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-212	3.5.1-65	A

Table 3.5.2-16 Turbine Enclosure (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)	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-67	3.5.1-47	A
Concrete: Foundation (inaccessible)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A

Table 3.5.2-16 Turbine Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation (inaccessible)	Shelter, Protection	Reinforced concrete	Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
	Shelter, Protection	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
	Shielding	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
	Structural Support	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
Conduit	Shelter, Protection	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
	Structural Support	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	A

Table 3.5.2-16 Turbine Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Conduit	Structural Support	Galvanized Steel	Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Doors	Flood Barrier	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	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
Equipment supports and foundations	Structural Support	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
Expansion Joint	Expansion/ Separation	Elastomer	Air - Indoor, Uncontrolled	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring (B.2.1.35)	VII.G.A-19	3.3.1-57	E, 1
Hatches/Plugs	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
	Shielding	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A

Table 3.5.2-16 Turbine Enclosure (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.2.1.35)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.34)	III.A3.T-12	3.5.1-70	A, 2
	Shielding	Concrete Block	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.34)	III.A3.T-12	3.5.1-70	A, 2
	Structural Support	Concrete Block	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.34)	III.A3.T-12	3.5.1-70	A, 2
Metal components: All structural members	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	A
Metal decking	Shelter, Protection	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
	Structural Support	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
Metal panels	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
	Shielding	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
Miscellaneous steel (catwalks, stairs, handrails, ladders, vents and louvers, platforms, etc.)	Shelter, Protection	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	A

Table 3.5.2-16 Turbine Enclosure (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, vents and louvers, platforms, etc.)	Shelter, Protection	Aluminum	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	A
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	A
Panels, Racks, Cabinets, and Other Enclosures	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	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
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	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
Penetration seals	Flood Barrier	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A, 3
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A, 3
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A, 3
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A, 3

Table 3.5.2-16 Turbine Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Penetration seals	Flood Barrier	Grout	Groundwater/Soil	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A, 3
	Shelter, Protection	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A, 3
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A, 3
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A, 3
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A, 3
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A, 3
Penetration sleeves	Flood Barrier	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			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
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C

Table 3.5.2-16 Turbine Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Penetration sleeves	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			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
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Precast Panel	Flood Barrier	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
Roofing (Built Up Roofing)	Shelter, Protection	Elastomer	Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
Roofing: (Scuppers)	Direct Flow	PVC	Air - Outdoor	None	None			J

Table 3.5.2-16 Turbine Enclosure (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.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
	Shelter, Protection	Aluminum	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
		Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
Seismic Gap Filler	Expansion/ Separation	Elastomer	Air - Indoor, Uncontrolled	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring (B.2.1.35)	VII.G.A-19	3.3.1-57	E, 1
			Air - Outdoor	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring (B.2.1.35)	VII.G.A-20	3.3.1-57	E, 1
Sliding (support) surfaces	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
		Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
		Lubrite	Air - Indoor, Uncontrolled	Loss of Mechanical Function	Structures Monitoring (B.2.1.35)	III.B4.TP-46	3.5.1-74	A
		Stainless Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	A
Steel elements: (Birdscreen)	Filter	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C

Table 3.5.2-16 Turbine Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Steel elements: Sump liners, liner anchors, integral attachments	Water retaining boundary	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
			Raw Water	Loss of Material	Structures Monitoring (B.2.1.35)	VII.G.A-33	3.3.1-64	E, 1
Tube Track (instrument tray or raceway)	Shelter, Protection	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
	Structural Support	Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C

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 Structures Monitoring (B.2.1.35) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination.

2. Masonry walls are inspected as a part of the Structures Monitoring (B.2.1.35) program, which includes the ten attributes of NUREG-1801 Masonry Walls (B.2.1.34) program.

3. NUREG-1801 does not contain grout penetration seals, however cracking, loss of bond and 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.2.1.35) program.

Table 3.5.2-17
Yard Facilities
Summary of Aging Management Evaluation

Table 3.5.2-17 Yard Facilities

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting (Structural)	Structural Support	Aluminum	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
		Carbon and Low Alloy Steel Bolting	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
		Galvanized Bolting	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
Cable Trays and Gutters	Shelter, Protection	Aluminum	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	A
	Structural Support	Aluminum	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	A
Concrete Anchors	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A3.TP-261	3.5.1-88	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C

Table 3.5.2-17 Yard Facilities (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 - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-24	3.5.1-63	A
Concrete Embedments	Structural Support	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	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 - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	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)	Flood Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
	Missile Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A3.TP-26	3.5.1-66	A

Table 3.5.2-17 Yard Facilities (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)	Structural Support	Reinforced concrete	Air - Outdoor	Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
Concrete: Above-grade exterior (inaccessible)	Flood Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	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.2.1.35)	III.A6.TP-104	3.5.1-65	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-108	3.5.1-42	A
Concrete: Below-grade exterior (inaccessible)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.35)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A

Table 3.5.2-17 Yard Facilities (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)	Flood Barrier	Reinforced concrete	Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-67	3.5.1-47	A
	Missile Barrier	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.35)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-67	3.5.1-47	A
	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.35)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-67	3.5.1-47	A
	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.35)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A

Table 3.5.2-17 Yard Facilities (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)	Structural Support	Reinforced concrete	Groundwater/Soil	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-67	3.5.1-47	A
Concrete: Below-grade interior (accessible) walls, floor, ceiling	Flood Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-24	3.5.1-63	A
	Missile Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-24	3.5.1-63	A
	Shelter, Protection	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-24	3.5.1-63	A
	Structural Support	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A

Table 3.5.2-17 Yard Facilities (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Below-grade interior (accessible) walls, floor, ceiling	Structural Support	Reinforced concrete	Air - Outdoor	Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-24	3.5.1-63	A
Concrete: Foundation (accessible)	Flood Barrier	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-24	3.5.1-63	A
	Shelter, Protection	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-24	3.5.1-63	A
	Structural Support	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-24	3.5.1-63	A
Concrete: Foundation (inaccessible)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.35)	III.A3.TP-30	3.5.1-44	A

Table 3.5.2-17 Yard Facilities (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Concrete: Foundation (inaccessible)	Flood Barrier	Reinforced concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-67	3.5.1-47	A
	Shelter, Protection	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.35)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-67	3.5.1-47	A
	Structural Support	Reinforced concrete	Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.35)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-67	3.5.1-47	A

Table 3.5.2-17 Yard Facilities (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Conduit	Shelter, Protection	Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
	Structural Support	Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Doors	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
Duct Banks	Shelter, Protection	Concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
	Structural Support	Concrete	Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A
Equipment supports and foundations	Structural Support	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
			Groundwater/Soil	Cracking and Distortion	Structures Monitoring (B.2.1.35)	III.A3.TP-30	3.5.1-44	A
				Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A

Table 3.5.2-17 Yard Facilities (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.2.1.35)	III.A3.TP-29	3.5.1-67	A
Hatches/Plugs (includes manhole covers)	Flood Barrier	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
		Ductile Cast Iron	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
	Shelter, Protection	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
		Ductile Cast Iron	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
Masonry walls: Above-grade exterior	Shelter, Protection	Concrete Block	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.34)	III.A3.T-12	3.5.1-70	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	C
	Structural Support	Concrete Block	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	C
				Cracking	Masonry Walls (B.2.1.34)	III.A3.T-12	3.5.1-70	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	C
Metal components: All structural members (including RR Bridge Steel)	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A

Table 3.5.2-17 Yard Facilities (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Metal components: All structural members (including RR Bridge Steel)	Structural Support	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
Metal siding (includes metal roof panels)	Shelter, Protection	Aluminum	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-6	3.5.1-93	C
		Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
	Structural Support	Aluminum	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-6	3.5.1-93	C
		Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
Miscellaneous steel (catwalks, stairs, handrails, ladders, vents and louvers, platforms, etc.)	Structural Support	Aluminum	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-6	3.5.1-93	C
		Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
		Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	A
Panels, Racks, Cabinets, and Other Enclosures	Shelter, Protection	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
	Structural Support	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C

Table 3.5.2-17 Yard Facilities (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Penetration seals	Flood Barrier	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
		Grout	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A, 1
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A, 1
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A, 1
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A, 1
	Shelter, Protection	Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
		Grout	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A, 1
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A, 1
			Groundwater/Soil	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-212	3.5.1-65	A, 1
				Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A, 1
Penetration sleeves	Shelter, Protection	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C

Table 3.5.2-17 Yard Facilities (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Penetration sleeves	Shelter, Protection	Carbon Steel	Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Flood Barrier	Elastomer	Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
	Shelter, Protection	Elastomer	Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
Seismic Gap Filler	Expansion/ Separation	Elastomer	Air - Outdoor	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring (B.2.1.35)	VII.G.A-20	3.3.1-57	E, 2
Steel Components (Bus Duct)	Shelter, Protection	Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
	Structural Support	Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
Steel Components: (Floor Drains)	Direct Flow	Ductile Cast Iron	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Tank Dikes	Water retaining boundary	Soil	Air - Outdoor	Loss of Material or Loss of Form	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)			G
			Groundwater/Soil	Loss of Material or Loss of Form	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36)	III.A6.T-22	3.5.1-58	A

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. NUREG-1801 does not contain grout penetration seals, however cracking, loss of bond and 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.2.1.35) program.

2. The Structures Monitoring (B.2.1.35) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination.

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3.6 AGING MANAGEMENT OF ELECTRICAL COMMODITIES

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)
- Electrical Penetrations (2.5.2.5.2)
- Fuse Holders (2.5.2.5.3)
- High Voltage Insulators (2.5.2.5.4)
- Insulation Material for Electrical Cables and Connections (2.5.2.5.5)
- Metal Enclosed Bus (2.5.2.5.6)
- Switchyard Bus and Connections, Transmission Conductors, and Transmission Connectors (2.5.2.5.7)

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.3.1.2) program and 2) in the primary containment aging management review.

3.6.2 RESULTS

The following table summarizes 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 Effects Requiring Management

The following aging effect associated with the Cable Connections (Metallic Parts) requires management:

- Increased Resistance of Connection

Aging Management Programs

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.2.1.43)

3.6.2.1.2 Fuse Holders (Not Part of Active Equipment): Metallic Clamps

Materials

The materials of construction for the Fuse Holders (Not Part of Active Equipment): Metallic Clamps are:

- Various Metals Used for Electrical Connections

Environments

The Fuse Holders (Not Part of Active Equipment): Metallic Clamps are exposed to the following environments:

- Air - Indoor, Controlled
- Air - Indoor, Uncontrolled

Aging Effects Requiring Management

The following aging effects associated with the Fuse Holders (Not Part of Active Equipment): Metallic Clamps components require management:

- Increased Resistance of Connection
- Increased Resistance of Connection; Fatigue

Aging Management Programs

The following aging management program manages the aging effects for the Fuse Holders (Not Part of Active Equipment): Metallic Clamps components:

- Fuse Holders (B.2.1.42)

3.6.2.1.3 High Voltage Insulators

Materials

The materials of construction for the High Voltage Insulators are:

- Cement
- Metal
- Porcelain

Environments

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.

3.6.2.1.4 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 the Insulation Material for Electrical Cables and Connections are:

- Various Organic Polymers

Environments

The Insulation Material for Electrical Cables and Connections are exposed to the following environments:

- Adverse Localized Environment Caused by Significant Moisture

- Adverse Localized Environment Caused by Heat, Radiation, or Moisture

Aging Effects 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.2.1.40)
- Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (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 (B.2.1.39)

3.6.2.1.5 Metal Enclosed Bus

Materials

The materials of construction for the Metal Enclosed Bus are:

- Various Metals Used for Electrical Bus and Connections
- Elastomers
- Steel
- 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 Programs

The following aging management programs manage the aging effects for the Metal Enclosed Bus:

- Metal Enclosed Bus (B.2.1.41)
- Structures Monitoring (B.2.1.35)

3.6.2.1.6 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

Environments

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 LGS 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.

<u>Salt Deposits and Surface Contamination</u>

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.

LGS is not located near the seacoast. It is located inland, in southeastern Pennsylvania. LGS is located in an area where industrial airborne particle concentrations are comparatively low, since it is located in a suburban 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 LGS's location and confirmed by its operating experience, surface contamination is not a significant aging effect for LGS. 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 and insulators 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 LGS'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 LGS 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 transmission conductors and connectors and switchyard bus and connections evaluated for LGS 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. 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 LGS are a tie line between the 500 kV and 220 kV substations. These conductors are 1590 MCM 54/19 aluminum conductor steel reinforced (ACSR). Each phase has two conductors. The 1590 MCM 54/19 ACSR transmission conductor is a large, substantial transmission conductor. It is approximately 1.5 inches in diameter and is configured with 19 steel conductors wrapped by 54 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 1590 MCM ACSR are 54500 lbs and 19075 lbs, respectively.

The PECO 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 of 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 LGS in scope transmission conductors are the same type of transmission conductors evaluated in the Ontario Hydroelectric study and in the analysis of 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 LGS transmission conductors.

LGS is located in an area where industrial airborne particle concentrations are comparatively low, since it is located in a suburban 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 LGS transmission conductors (which are located in a suburban 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 LGS 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 LGS.

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 35425 lbs; i.e., there is a 65 percent ultimate strength margin. The Ontario Hydroelectric study showed a 30 percent loss of composite conductor strength in an 80 year old conductor. In the case of the 1590 MCM ACSR transmission conductors, a 30 percent loss of ultimate strength would mean that there would still be a 35 percent ultimate strength margin between what is required by the NESC and the actual conductor strength. Therefore the design and physical construction of the LGS 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.

1590 MCM 54/19 ACSR Transmission Conductor	
Ultimate Strength, New	54500 lbs.
Postulated Ultimate Strength at 80 Years	38150 lbs.
NESC Design Strength, Required	32700 lbs.
NESC Heavy Load Tension, Required	19075 lbs.

In conclusion, the in scope LGS 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.

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 lock washers and stainless steel Belleville washers (not electroplated) that provide vibration absorption and prevent loss of preload. Therefore, 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. Since there are no connections to moving or vibrating equipment, wind-induced abrasion and fatigue is not applicable to LGS switchyard bus.

Corrosion – Switchyard Bus

LGS switchyard is not subject to a saline environment or industrial air pollution. It is located inland, in southeastern Pennsylvania, in an area where industrial airborne particle concentrations are comparatively low, since it is located in a suburban area with no heavy industry nearby. Aluminum bus material does not experience any appreciable aging effects in this environment. Therefore, corrosion is not an applicable aging mechanism.

Oxidation or Loss of Pre-Load – Switchyard Bus

Switchyard bus connections employ good bolting practices. The connections are treated with corrosion inhibitors to avoid connections oxidations and torqued at the time of installation to avoid loss of pre-load. The switchyard bus bolted connections are designed and installed using lock washers and stainless steel Belleville washers (not electroplated) that provide vibration absorption and prevent loss of preload. Therefore, oxidation and loss of preload are not applicable aging mechanisms.

Conclusion

Aging management activities for LGS switchyard bus and connections and transmission conductors and 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.

3.6.2.3 AMR Results Not Consistent With or Not Addressed in the GALL Report

LGS 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.

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Table 3.6.1 Summary of Aging Management Evaluations for 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 (See subsection 3.6.2.2.1)	Environmental Qualification is a TLAA; further evaluation is documented in Subsection 3.6.2.2.1 and Section 4.4.
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 (See subsection 3.6.2.2.2)	Not applicable. NUREG-1801, loss of material aging effects are not applicable to LGS. See subsection 3.6.2.2.2 for further evaluation.
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 (See subsection 3.6.2.2.2)	Not applicable. NUREG-1801, reduced insulation resistance aging effects are not applicable to LGS. See subsection 3.6.2.2.2 for further evaluation.

Table 3.6.1 Summary of Aging Management Evaluations for Electrical Components

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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 (See subsection 3.6.2.2.3)	Not applicable. NUREG-1801, loss of conductor strength aging effects are not applicable to LGS. 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 (See subsection 3.6.2.2.3)	Not applicable. NUREG-1801, increased resistance of connection aging effects are not applicable to LGS. 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 (See subsection 3.6.2.2.3)	Not applicable. NUREG-1801, loss of material and increased resistance of connection aging effects are not applicable to LGS. See subsection 3.6.2.2.3 for further evaluation.

Table 3.6.1 Summary of Aging Management Evaluations for 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 (See subsection 3.6.2.2.3)	Not applicable. NUREG-1801, loss of material aging effects are not applicable to LGS. 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.2.1.38) program will be used to manage the reduced insulation resistance of the 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 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.2.1.39) program will be used to manage the reduced insulation resistance of the insulation material in electrical cables and connections for in scope neutron monitoring and radiation monitoring circuits, 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.2.1.40) program will be used to manage the reduced insulation resistance of the conductor insulation in 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 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.2.1.41) program will be used to manage the surface cracking, crazing, scuffing, dimensional change, shrinkage, discoloration, hardening and loss of strength of 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.2.1.41) program will be used to manage the increased resistance of connection of various metals in metal enclosed bus: bus/connections, exposed to air – indoor, controlled or uncontrolled or air – outdoor.

Table 3.6.1 Summary of Aging Management Evaluations for Electrical Components

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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.2.1.41) program will be used to manage the reduced insulation resistance of porcelain and various organic polymers in metal enclosed bus: insulation/insulators, exposed to air – indoor, controlled or uncontrolled or air – outdoor.
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	Consistent with NUREG-1801. The Structures Monitoring (B.2.1.35) program will be used to manage the loss of material of steel in metal enclosed bus: external surface of enclosure assemblies, exposed to air – indoor, uncontrolled or air – outdoor.
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	Not applicable. There is no galvanized steel or aluminum in metal enclosed bus, external surface enclosure assemblies, exposed to air – outdoor, that are in scope of license renewal at LGS.

Table 3.6.1 Summary of Aging Management Evaluations for 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	Consistent with NUREG-1801. The Fuse Holders (B.2.1.42) program will be used to manage the increased resistance of connection and fatigue of various metals used for electrical connections in the metallic portions of fuse holders that are not part of active equipment, exposed to air – indoor, uncontrolled.
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	Consistent with NUREG-1801. The Fuse Holders (B.2.1.42) program will be used to manage the increased resistance of connection of various metals used for electrical connections in the metallic portions of fuse holders that are not part of active equipment, exposed to air – indoor, controlled or uncontrolled.

Table 3.6.1 Summary of Aging Management Evaluations for 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.2.1.43) program will be used to manage the increased resistance of connection of 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 air – outdoor, that are in scope of license renewal at LGS.

Table 3.6.1 Summary of Aging Management Evaluations for 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.2.1.43)	VI.A.LP-30	3.6.1-18	A
Conductor Insulation for Inaccessible Power Cables Greater Than or Equal to 400V	Electrical Continuity	Various Organic Polymers	Adverse Localized Environment Caused by Significant Moisture	Reduced Insulation Resistance	Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (B.2.1.40)	VI.A.LP-35	3.6.1-10	A
Electrical Equipment Subject to 10 CFR 50.49 EQ Requirements	Electrical Continuity	Various Polymeric and Metallic Materials	Adverse Localized Environment Caused by Heat, Radiation, Oxygen, Moisture, or Voltage	Various Aging Effects	Environmental Qualification (EQ) of Electric Components (B.3.1.2)	VI.B.L-05	3.6.1-1	A
Fuse Holders (Not Part of Active Equipment): Insulation Material	Electrical Continuity	Various Organic Polymers	Air - Indoor, Controlled or Uncontrolled	None	None	VI.A.LP-24	3.6.1-21	A
Fuse Holders (Not Part of Active Equipment): Metallic Clamps	Electrical Continuity	Various Metals Used for Electrical Connections	Air - Indoor, Controlled or Uncontrolled	Increased Resistance of Connection	Fuse Holders (B.2.1.42)	VI.A.LP-31	3.6.1-17	A
			Air - Indoor, Uncontrolled	Increased Resistance of Connection; Fatigue	Fuse Holders (B.2.1.42)	VI.A.LP-23	3.6.1-16	A
High Voltage Insulators	Insulate (Electrical)	Cement	Air - Outdoor (External)	None	None	VI.A.LP-32	3.6.1-2	I, 1

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
High Voltage Insulators	Insulate (Electrical)	Cement	Air - Outdoor (External)	None	None	VI.A.LP-28	3.6.1-3	I, 2
		Metal	Air - Outdoor (External)	None	None	VI.A.LP-32	3.6.1-2	I, 1
		Metal	Air - Outdoor (External)	None	None	VI.A.LP-28	3.6.1-3	I, 2
		Porcelain	Air - Outdoor (External)	None	None	VI.A.LP-32	3.6.1-2	I, 1
		Porcelain	Air - Outdoor (External)	None	None	VI.A.LP-28	3.6.1-3	I, 2
Insulation Material for Electrical Cables and Connections	Electrical Continuity	Various Organic Polymers	Adverse Localized Environment Caused by Heat, Radiation, or Moisture	Reduced Insulation Resistance	Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (B.2.1.38)	VI.A.LP-33	3.6.1-8	A
Insulation Material for Electrical Cables and Connections Used in Instrumentation Circuits	Electrical Continuity	Various Organic Polymers	Adverse Localized Environment Caused by Heat, Radiation, or Moisture	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.2.1.39)	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.2.1.41)	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.2.1.41)	VI.A.LP-29	3.6.1-11	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
Metal Enclosed Bus: External Surface of Enclosure Assemblies	Shelter, Protection	Steel	Air - Indoor, Controlled (External)	None	None	VI.A.LP-44	3.6.1-21	A
			Air - Indoor, Uncontrolled or Air, Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	VI.A.LP-43	3.6.1-14	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.2.1.41)	VI.A.LP-26	3.6.1-13	A
Switchyard Bus and Connections	Electrical Continuity	Aluminum, Stainless Steel	Air - Outdoor (External)	None	None	VI.A.LP-39	3.6.1-6	I, 3
Transmission Conductors	Electrical Continuity	Aluminum, Steel	Air - Outdoor (External)	None	None	VI.A.LP-47	3.6.1-7	I, 4
					None	VI.A.LP-38	3.6.1-4	I, 5
Transmission Connectors	Electrical Continuity	Stainless Steel	Air - Outdoor (External)	None	None	VI.A.LP-48	3.6.1-5	I, 6

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 LGS design and operating experience, loss of material is not an applicable aging effect for LGS high voltage insulators. In scope high voltage insulators are not subject to mechanical wear caused by wind blowing on transmission conductors.

2. Based on LGS design and operating experience, reduced insulation is not an applicable aging effect for LGS high voltage insulators. In scope high voltage insulators are not subject to contamination.

3. Based on LGS design and operating experience, loss of material and increased resistance of connection are not applicable aging effects for LGS switchyard bus and connections. In scope switchyard bus and connections are not subject to wind induced abrasion nor oxidation or loss of pre-load.

4. Based on LGS design and operating experience loss of material is not an applicable aging effect for LGS transmission conductors. In scope LGS transmission conductors are not subject to wind induced abrasion.

5. Based on LGS design and operating experience loss of conductor strength is not an applicable aging effect for LGS transmission conductors. In scope LGS transmission conductors are not subject to corrosion.

6. Based on LGS design and operating experience increased resistance of connection is not an applicable aging effect for LGS transmission connectors. In scope LGS transmission connectors are not subject to oxidation or loss of pre-load.

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4.0 TIME-LIMITED AGING ANALYSES

4.1 IDENTIFICATION 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 LGS TIME-LIMITED AGING ANALYSES

TLAAs have been identified for LGS 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)
- Design Basis Documents (DBDs)
- General Electric and General Electric Hitachi design analyses and reports
- Bechtel design analyses and reports
- Stone and Webster, Structural Integrity Associates, and other vendor analyses and reports
- Calculation database
- 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.

LRA 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 LGS. Those with a "Yes" entry apply for LGS and the LRA section where they are evaluated is provided. Those with a "No" entry do not apply for LGS. No TLAA was identified for these categories either because they are associated with design features not employed at LGS or because no analysis was identified in this category that meet all six TLAA criteria.

Table 4.1-1 Review of Generic TLAAs Listed in NUREG-1800, Tables 4.1-2 and 4.1-3		
NUREG-1800 Example TLAAs	**Applies for LGS?**	**LRA Section**
NUREG-1800, Table 4.1-2 - Potential TLAAs		
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)	No	N/A
Inservice local metal containment corrosion analyses (Subsection 4.6)	No	N/A
NUREG-1800, Table 4.1-3 – Additional Examples of Plant-Specific TLAAs		
Intergranular separation in the heat-affected zone (HAZ) of reactor vessel low-alloy steel under austenitic SS cladding	No	N/A
Low-temperature overpressure protection (LTOP) analyses (PWR)	No	N/A
Fatigue analysis for the main steam supply lines to the turbine driven auxiliary feedwater pumps (HPCI and RCIC pumps at LGS)	Yes	4.3.1
Fatigue analysis for the reactor coolant pump flywheel	No	N/A
Fatigue analysis of polar crane (reactor enclosure crane at LGS)	Yes	4.6.1
Flow-induced vibration endurance limit for the reactor vessel internals	No	N/A
Transient cycle count assumptions for the reactor vessel internals	Yes	4.3.4
Ductility reduction of fracture toughness for the reactor vessel internals	Yes	4.6.3
Leak-before-break	No	N/A
Fatigue analysis for the containment liner plate	Yes	4.5.1
Containment penetration pressurization cycles	Yes	4.5.1
Metal corrosion allowance	No	N/A
High-energy line-break postulation based on fatigue CUF	Yes	4.3.5
Inservice flaw growth analyses that demonstrate structure stability for 40 years	No	N/A

4.1.2 EVALUATION OF LGS TIME-LIMITED AGING ANALYSES

Each section of Chapter 4 evaluates one or more related TLAAs. Information is provided using the following definitions:

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 LGS. The methods used are identified in each TLAA evaluation section.

4.1.4 SUMMARY OF RESULTS

Several categories of TLAAs were identified for LGS. The TLAAs are grouped together by affected component type and aging effect analyzed, as shown in the TLAA Summary in Table 4.1-2. The table includes a reference to the applicable section of the application that evaluates each TLAA. LRA Subsection 4.1.5 identifies and evaluates exemptions to 10 CFR 50.12 in effect that are based upon TLAAs. LRA subsections 4.2 through 4.6 provide descriptions and evaluations of the TLAAs and classify their disposition.

Table 4.1-2 SUMMARY OF RESULTS - LGS TIME-LIMITED AGING ANALYSES		
TLAA DESCRIPTION	**DISPOSITION**	**LRA SECTION**
IDENTIFICATION OF TIME-LIMITED AGING ANALYSES		4.1
Identification of LGS Time-Limited Aging Analyses		4.1.1
Evaluation of LGS Time-Limited Aging Analyses		4.1.2
Acceptance Criteria		4.1.3
Summary of Results		4.1.4
Identification and Evaluation of LGS Exemptions		4.1.5
REACTOR PRESSURE VESSEL NEUTRON EMBRITTLEMENT ANALYSIS		4.2
Neutron Fluence Projections	§54.21(c)(1)(ii)	4.2.1
Upper-Shelf Energy	§54.21(c)(1)(ii)	4.2.2
Adjusted Reference Temperature	§54.21(c)(1)(ii)	4.2.3
Pressure – Temperature Limits	§54.21(c)(1)(iii)	4.2.4
Axial Weld Inspection	§54.21(c)(1)(ii)	4.2.5
Circumferential Weld Inspection	§54.21(c)(1)(iii)	4.2.6
Reactor Pressure Vessel Reflood Thermal Shock	§54.21(c)(1)(ii)	4.2.7
METAL FATIGUE		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 Calculations	§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)(i)	4.3.4
High-Energy Line Break (HELB) Analyses Based Upon Fatigue	§54.21(c)(1)(i)	4.3.5
ENVIRONMENTAL QUALIFICATION (EQ) OF ELECTRIC COMPONENTS		4.4
Environmental Qualification (EQ) of Electric Components	§54.21(c)(1)(iii)	4.4.1
CONTAINMENT LINER AND PENETRATIONS FATIGUE ANALYSIS		4.5
Containment Liner and Penetrations Fatigue Analysis	§54.21(c)(1)(i)	4.5.1
OTHER PLANT-SPECIFIC TIME-LIMITED AGING ANALYSES		4.6
Reactor Enclosure Crane Cyclic Loading Analysis	§54.21(c)(1)(i)	4.6.1
Emergency Diesel Generator Enclosure Cranes Cyclic Loading Analysis	§54.21(c)(1)(i)	4.6.2
RPV Core Plate Rim Hold-Down Bolt Loss of Preload	§54.21(c)(1)(i)	4.6.3
Main Steam Line Flow Restrictors Erosion Analysis	§54.21(c)(1)(i)	4.6.4
Jet Pump Auxiliary Spring Wedge Assembly	§54.21(c)(1)(i)	4.6.5
Jet Pump Restrainer Bracket Pad Repair Clamps	§54.21(c)(1)(ii)	4.6.6
Refueling Bellows and Support Cyclic Loading Analysis	§54.21(c)(1)(i)	4.6.7
Downcomers and MSRV Discharge Piping Fatigue Analyses	§54.21(c)(1)(i)	4.6.8
Jet Pump Slip Joint Repair Clamps	§54.21(c)(1)(iii)	4.6.9

4.1.5 IDENTIFICATION AND EVALUATION OF LGS EXEMPTIONS

10 CFR 54.21(c)(2) states: A list must be provided of plant-specific exemptions granted pursuant to 10 CFR 50.12 and in effect that are based on time-limited aging analyses as defined in 10 CFR 54.3. The applicant shall provide an evaluation that justifies the continuation of these exemptions for the period of extended operation. A search of docketed correspondence, the operating license, and the Updated Final Safety Analysis Report (UFSAR) identified the exemptions in effect that are based upon a time-limited aging analysis. These exemptions are shown in Table 4.1-3. Neither of these two exemptions is required for the period of extended operation. They are associated with Pressure-Temperature (P-T) limits developed using exemptions to 10 CFR 50, Appendix G, to permit use of ASME Code Cases N-588 and N-640. Since the current P-T limits are only valid for 32 Effective Full Power Years (EFPY), they must be replaced prior to the period of extended operation, as described in Section 4.2.1. Therefore, these exemptions will not be required during the period of extended operation.

Table 4.1-3 – LGS EXEMPTION EVALUATION TABLE

LGS Unit Date	Exemption Description	Based upon TLAA?	In Effect during PEO?
Unit 1 5/15/2000	The NRC has granted a substantive exemption to 10 CFR 50.60(a) and 10 CFR 50 Appendix G to permit the use of Code Cases N-588 and N-640 for development of P-T limits. Code Case N-588 permits the postulation of a circumferentially-oriented flaw (in lieu of an axially-oriented flaw) for the evaluation of circumferential reactor pressure vessel (RPV) welds. Code Case N-640 permits the use of an alternate fracture toughness curve for reactor vessel materials in determining the P-T limits. The current exemption will not be needed during the period of extended operation (PEO) because 10 CFR 50, Appendix G, requires new P-T limits to be developed for higher fluence values that are to be approved by the NRC prior to exceeding 32 EFPY, which is predicted to occur before the PEO. See Section 4.2.1 and Section 4.2.4 for additional information.	Yes	No
Unit 2 3/21/2001	The NRC has granted a substantive exemption to 10 CFR 50.60(a) and 10 CFR 50, Appendix G, to allow use of ASME Code Case N-640 to support a change to LGS Technical Specification Figure 3.4.6.1-1, "Minimum Reactor Vessel Temperature versus Reactor Vessel Pressure." The current exemption will not be needed during the PEO because 10 CFR 50, Appendix G, requires new P-T limits to be developed for higher fluence values that are to be approved by the NRC prior to exceeding 32 EFPY, which is predicted to occur prior to the PEO. See Section 4.2.1 and Section 4.2.4 for additional information.	Yes	No

4.2 REACTOR PRESSURE VESSEL NEUTRON EMBRITTLEMENT ANALYSIS

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 LGS 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 1.0 E+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 upon the RT_{NDT} and ΔRT_{NDT} values computed for the licensed operating period along with appropriate margins.

The reactor pressure vessel material ΔRT_{NDT} and USE values, calculated on the basis of neutron fluence, are part of the licensing basis and support safety determinations. 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 also been identified as TLAAs.

The following TLAAs related to neutron embrittlement are evaluated in the LRA subsections listed below:

- Neutron Fluence Projections (4.2.1)
- Upper-Shelf Energy (4.2.2)
- Adjusted Reference Temperature (4.2.3)
- Pressure – Temperature Limits (4.2.4)
- Axial Weld Inspection (4.2.5)
- Circumferential Weld Inspection (4.2.6)
- RPV Reflood Thermal Shock (4.2.7)
- RPV Core Plate Rim Hold-down Bolt Loss of Preload (4.6.3)
- Jet Pump Auxiliary Spring Wedge Assembly (4.6.5)
- Jet Pump Restrainer Bracket Pad Repair Clamps (4.6.6)
- Jet Pump Slip Joint Repair Clamps (4.6.9)

4.2.1 NEUTRON FLUENCE PROJECTIONS

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 were developed using discrete ordinates transport fluence methodology. The projections predicted the neutron fluence expected to occur during 32 Effective Full Power Years (EFPY) of plant operation, which is 1.3 E+18 n/cm^2 at the peak inside surface location (clad/base metal interface). 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. These fluence projections have been identified as TLAAs requiring evaluation for the period of extended operation.

TLAA Evaluation:

The first step in updating fluence projections for 40 years and 60 years is to update the 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 updated EFPY projections is summarized below.

<u>EFPY Projections</u>

Unit 1 started commercial operation with a licensed thermal power of 3293 MWt and operated with that maximum power level during cycles 1 through 6. A five percent power rerate to 3458 MWt was implemented for Unit 1 at the beginning of cycle 7. This maximum power level was projected to continue through mid-cycle 14, when an additional 1.65 percent power uprate is scheduled for implementation to achieve 3515 MWt. The power history shows that Unit 1 had operated for 21.1 EFPY as of the end of cycle 13, in spring 2010.

No further power uprates beyond 3515 MWt are assumed for these EFPY projections. Actual plant capacity factors for recent operational cycles have increased to over 95 percent and, as a result, the 40-year average capacity factor will approach 95 percent. Future operating cycles are assumed to include 713 days of full power operation every two years (i.e. 24-month cycles with 17 outage days and no downpowers assumed). For Unit 1, this results in the accumulation of 35 EFPY at the end of 40 years of operation in October 2024 and 55 EFPY at the end of 60 years of operation. For each unit, prior to exceeding 32 EFPY, updated P-T limits will be developed for higher fluence values in accordance with 10 CFR 50, Appendix G requirements, as described in section 4.2.4.

Unit 2 started commercial operation with a licensed thermal power of 3293 MWt and operated with that maximum power level during cycles 1 through 3. A five percent power uprate to 3458 MWt was implemented for Unit 2 at the beginning of cycle 4. This maximum power level was projected to continue through the end of cycle 11. Unit 2 is scheduled for an additional 1.65 percent power uprate to achieve 3515 MWt at the beginning of cycle 12. The power history shows that Unit 2 had operated for 17.6 EFPY as of the end of cycle 10, in spring 2009.

No further power uprates beyond 3515 MWt are assumed for these EFPY projections. Future operating cycles are assumed to include 713 days of full power operation every two years (i.e. 24-month cycles with 17 outage days and no downpowers assumed). This results in the accumulation of 37 EFPY at the end of 40 years of operation in June 2029 and 57 EFPY at the end of 60 years of operation. (Note: Unit 1 will also be evaluated at 37 EFPY and 57 EFPY for consistency with the Unit 2 evaluations).

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. RAMA was used to develop 40-year, 37 EFPY fluence projections and 60-year, 57 EFPY fluence values for Unit 1 and Unit 2. Use of this methodology for evaluations of fluence for LGS was performed in accordance with guidelines presented in NRC Regulatory Guide 1.190 (Reference 4.7.2). The 57 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 value of neutron irradiation for identification of beltline materials, 10 CFR 50, Appendix H, defines a fluence value of 1.0 E+17 n/cm^2.

37 EFPY and 57 EFPY RAMA fluence projections were developed for all reactor vessel beltline materials. The 57 EFPY fluence projections were used to evaluate reactor vessel fracture toughness for the period of extended operation, as described in LRA subsection 4.2.2 and 4.2.3. 37 EFPY and 57 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 LGS 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 N16 Water Level Instrumentation (WLI) nozzles and the N17 Low Pressure Coolant Injection (LPCI) nozzles, which are included in the reactor vessel beltline. Several reactor vessel internals components are defined within the model, including jet pumps, top guide, and core support plate locations.

The reactor pressure vessel fluence values were determined at the interface of the RPV base metal and cladding (0T) for the RPV beltline materials, which includes the lower shell plates, lower-intermediate shell plates, axial welds (BA, BB, BC, BD, BE, BF, BG, BH, and BJ), circumferential weld AB, the N16 Water Level Instrumentation (WLI) nozzles, and the N17 LPCI nozzles and welds. The fluence projections for these nozzles are based upon the highest fluence value at the edge of each cutout location within the shell plate and are therefore considered applicable for the nozzle welds. The N16 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.

Reactor pressure vessel 1/4 T fluence values were then determined from the 0T values using two different methods permitted by Regulatory Guide 1.99, Revision 2. The first method used a plant-specific calculation of displacements per atom (dpa) in iron, substituting the ratio of dpa at the 1/4T depth to the dpa at 0T in place of the exponential attenuation factor in Equation 3. The second method used the generic exponential attenuation formulation provided in Equation 3. Since the 1/4 T values obtained using the plant-specific dpa method were higher than those resulting from the generic attenuation method, the plant-specific 1/4 T fluence values were used in evaluating the neutron embrittlement TLAAs.

Table 4.2.1-1 shows the fluence projections for Unit 1 reactor vessel beltline shells (plates), girth (circumferential) welds and axial (vertical) welds. The bounding fluence value determined for each shell ring is to be used in the evaluation of all three plates within each shell. Table 4.2.1-2 shows the fluence projections for Unit 1 beltline nozzle forgings.

Table 4.2.1-3 shows the fluence projections for Unit 2 reactor vessel beltline shells (plates), girth (circumferential) welds and axial (vertical) welds. The bounding fluence value determined for each shell ring is to be used in the evaluation of all three plates within each shell. Table 4.2.1-4 shows the fluence projections for Unit 2 beltline nozzle forgings.

TLAA Disposition: 10 CFR 54.21(c)(1)(ii) – The fluence analyses have been projected to the end of 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.

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Table 4.2.1-1
Unit 1 - Maximum Neutron Fluence >1.0 MeV in RPV Beltline Shells, Axial Welds, and Girth Welds at 37 EFPY and 57 EFPY

Locations			37 EFPY Values (40 Years)			57 EFPY Values (60 Years)		
Shell or Weld Number	RPV Azimuth	Elevation (inches)	Fluence at Clad / Base Metal Interface 0 T (n/cm^2)	Fluence at 1/4 T Plant-Specific Attenuation (n/cm^2)	Fluence at 1/4 T Generic Attenuation (n/cm^2)	Fluence at Clad / Base Metal Interface 0 T (n/cm^2)	Fluence at 1/4 T Plant-Specific Attenuation (n/cm^2)	Fluence at 1/4 T Generic Attenuation (n/cm^2)
1 [1]	25º	263.50	5.94E+17	4.05E+17	3.99E+17	8.35E+17	5.69E+17	5.61E+17
2 [2]	25º	320.50	7.83E+17	5.31E+17	5.26E+17	1.15E+18	7.78E+17	7.70E+17
3 [3]	27º	400.50	1.36E+16	9.88E+15	9.12E+15	2.06E+16	1.50E+16	1.38E+16
Vertical (Axial) Welds								
BA	317.5º	263.50	4.32E+17	2.98E+17	2.91E+17	5.88E+17	4.05E+17	3.95E+17
BB	77.5º	263.50	4.08E+17	2.79E+17	2.74E+17	5.89E+17	4.04E+17	3.96E+17
BC	197.5º	263.50	5.18E+17	3.56E+17	3.48E+17	7.42E+17	5.10E+17	4.98E+17
BD	255º	320.50	6.09E+17	4.16E+17	4.09E+17	9.04E+17	6.18E+17	6.07E+17
BE	15º	320.50	6.11E+17	4.18E+17	4.11E+17	9.08E+17	6.22E+17	6.10E+17
BF	135º	325.23	5.59E+17	3.85E+17	3.76E+17	8.06E+17	5.54E+17	5.42E+17
BG	0º	400.50	1.18E+16	8.50E+15	7.93E+15	1.81E+16	1.31E+16	1.22E+16
BH	120º	400.50	1.33E+16	9.75E+15	8.95E+15	2.02E+16	1.48E+16	1.35E+16
BJ	240º	400.50	1.33E+16	9.75E+15	8.95E+15	2.02E+16	1.48E+16	1.35E+16
Girth (Circumferential) Welds								
AB	25º	263.50	5.94E+17	4.05E+17	3.99E+17	8.35E+17	5.69E+17	5.61E+17
AC	27º	400.50	1.36E+16	9.88E+15	9.12E+15	2.06E+16	1.50E+16	1.38E+16

Table 4.2.1-2
Unit 1 - Maximum Neutron Fluence >1.0 MeV in RPV Beltline Nozzles at 37 EFPY and 57 EFPY

Locations			37 EFPY Values (~40 Years)			57 EFPY Values (60 Years)		
Nozzle Number	RPV Azimuth	Nozzle Plane Azimuth	Fluence at Clad / Base Metal Interface 0 T (n/cm^2)	Fluence at 1/4 T Plant-Specific Attenuation (n/cm^2)	Fluence at 1/4 T Generic Attenuation (n/cm^2)	Fluence at Clad / Base Metal Interface 0 T (n/cm^2)	Fluence at 1/4 T Plant-Specific Attenuation (n/cm^2)	Fluence at 1/4 T Generic Attenuation (n/cm^2)
Water Level Instrumentation (WLI) Nozzles								
N16	0º	180º	8.95E+16	6.33E+16	6.02E+16	1.43E+17	1.01E+17	9.63E+16
N16	100º	200º	1.27E+17	8.88E+16	8.52E+16	2.04E+17	1.43E+17	1.37E+17
N16	200	167º	2.19E+17	1.51E+17	1.47E+17	3.51E+17	2.43E+17	2.36E+17
N16	280º	200º	1.27E+17	8.88E+16	8.52E+16	2.04E+17	1.43E+17	1.37E+17
Low Pressure Coolant Injection (LPCI) Nozzles								
N17	45º	180º	3.16E+17	2.17E+17	2.12E+17	4.90E+17	3.37E+17	3.29E+17
N17	135º	180º	3.16E+17	2.17E+17	2.12E+17	4.90E+17	3.37E+17	3.29E+17
N17	225º	180º	3.16E+17	2.17E+17	2.12E+17	4.90E+17	3.37E+17	3.29E+17
N17	315º	180º	3.16E+17	2.17E+17	2.12E+17	4.90E+17	3.37E+17	3.29E+17

[1] Shell 1 is also referenced as Lower Shell 1, and it includes Plates 14-1, 14-2, and 14-3. The fluence values for the bounding location within the shell are reported. The 57 EFPY fluence value at 1/4 T determined using plant-specific attenuation is to be used in the evaluation of all three plates.
[2] Shell 2 is also referenced as Lower-Intermediate Shell 2, and it includes Plates 17-1, 17-2, and 17-3. The fluence values for the bounding location within the shell are reported. The 57 EFPY fluence value at 1/4 T determined using plant-specific attenuation is to be used in the evaluation of all three plates.
[3] Since the 57 EFPY fluence value for the bounding location within Shell 3 is less than 1.0 E+17 n/cm^2, this shell and the associated plates are not considered to be within the beltline and therefore do not require computation of USE or ART values for the period of extended operation.

Table 4.2.1-3
Unit 2 - Maximum Neutron Fluence >1.0 MeV in RPV Beltline Shells, Axial Welds, and Girth Welds at 37 EFPY and 57 EFPY

Locations			37 EFPY Values (~40 Years)			57 EFPY Values (60 Years)		
Shell or Weld Number	RPV Azimuth	Elevation (inches)	Fluence at Clad / Base Metal Interface 0T (n/cm^2)	Fluence at 1/4 T Plant-Specific Attenuation (n/cm^2)	Fluence at 1/4 T Generic Attenuation (n/cm^2)	Fluence at Clad / Base Metal Interface 0T (n/cm^2)	Fluence at 1/4 T Plant-Specific Attenuation (n/cm^2)	Fluence at 1/4 T Generic Attenuation (n/cm^2)
1 [1]	25º	263.50	5.63E+17	3.83E+17	3.77E+17	8.02E+17	5.45E+17	5.37E+17
2 [2]	25º	320.50	7.58E+17	5.13E+17	5.08E+17	1.12E+18	7.57E+17	7.49E+17
3 [3]	63º	400.50	1.29E+16	9.42E+15	8.66E+15	2.00E+16	1.46E+16	1.34E+16
Vertical (Axial) Welds								
BA	317.5º	263.50	3.90E+17	2.68E+17	2.61E+17	5.44E+17	3.74E+17	3.64E+17
BB	77.5º	263.50	4.03E+17	2.75E+17	2.70E+17	5.83E+17	3.99E+17	3.90E+17
BC	197.5º	263.50	5.05E+17	3.45E+17	3.38E+17	7.26E+17	4.98E+17	4.87E+17
BD	255º	320.50	6.02E+17	4.10E+17	4.04E+17	8.95E+17	6.10E+17	6.00E+17
BE	15º	320.50	6.05E+17	4.12E+17	4.05E+17	8.99E+17	6.13E+17	6.02E+17
BF	135º	326.23	5.20E+17	3.59E+17	3.49E+17	7.64E+17	5.27E+17	5.12E+17
BG	0º	400.50	1.16E+16	8.33E+15	7.76E+15	1.79E+16	1.29E+16	1.20E+16
BH	120º	400.50	1.27E+16	9.26E+15	8.48E+15	1.95E+16	1.43E+16	1.31E+16
BJ	240º	400.50	1.27E+16	9.26E+15	8.48E+15	1.95E+16	1.43E+16	1.31E+16
Girth (Circumferential) Welds								
AB	25º	263.50	5.63E+17	3.83E+17	3.77E+17	8.02E+17	5.45E+17	5.37E+17
AC	63º	400.50	1.29E+16	9.42E+15	8.66E+15	2.00E+16	1.46E+16	1.34E+16

Table 4.2.1-4
Unit 2 - Maximum Neutron Fluence >1.0 MeV in RPV Beltline Nozzles at 37 EFPY and 57 EFPY

Locations			37 EFPY Values (~40 Years)			57 EFPY Values (60 Years)		
Nozzle Number	RPV Azimuth	Nozzle Plane Azimuth	Fluence at Clad / Base Metal Interface 0T (n/cm^2)	Fluence at 1/4 T Plant-Specific Attenuation (n/cm^2)	Fluence at 1/4 T Generic Attenuation (n/cm^2)	Fluence at Clad / Base Metal Interface 0T (n/cm^2)	Fluence at 1/4 T Plant-Specific Attenuation (n/cm^2)	Fluence at 1/4 T Generic Attenuation (n/cm^2)
Water Level Instrumentation (WLI) Nozzles								
N16	0º	180º	9.05E+16	6.40E+16	6.06E+16	1.43E+17	1.01E+17	9.60E+16
N16	100º	200º	1.28E+17	8.95E+16	8.54E+16	2.03E+17	1.43E+17	1.36E+17
N16	200	167º	2.17E+17	1.50E+17	1.46E+17	3.47E+17	2.40E+17	2.33E+17
N16	280º	200º	1.28E+17	8.95E+16	8.54E+16	2.03E+17	1.43E+17	1.36E+17
Low Pressure Coolant Injection (LPCI) Nozzles								
N17	45º	180º	3.07E+17	2.10E+17	2.05E+17	4.78E+17	3.28E+17	3.20E+17
N17	135º	180º	3.07E+17	2.10E+17	2.05E+17	4.78E+17	3.28E+17	3.20E+17
N17	225º	180º	3.07E+17	2.10E+17	2.05E+17	4.78E+17	3.28E+17	3.20E+17
N17	315º	180º	3.07E+17	2.10E+17	2.05E+17	4.78E+17	3.28E+17	3.20E+17

[1] Shell 1 is also referenced as Lower Shell 1, and it includes Plates 14-1, 14-2, and 14-3. The fluence values for the bounding location within the shell are reported. The 57 EFPY fluence value at 1/4 T determined using plant-specific attenuation is to be used in the evaluation of all three plates.

[2] Shell 2 is also referenced as Lower-Intermediate Shell 2, and it includes Plates 17-1, 17-2, and 17-3. The fluence values for the bounding location within the shell are reported. The 57 EFPY fluence value at 1/4 T determined using plant-specific attenuation is to be used in the evaluation of all three plates.

[3] Since the 57 EFPY fluence value for the bounding location within Shell 3 is less than 1.0 E+17 n/cm^2, this shell and the associated plates are not considered to be within the beltline and therefore do not require computation of USE or ART values for the period of extended operation.

4.2.2 UPPER-SHELF ENERGY

TLAA Description:

The current licensing basis Charpy Upper Shelf Energy (USE) calculations were prepared for LGS 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.

Updated USE values for 57 EFPY were computed for the LGS Unit 1 and 2 beltline materials, including the Lower Shell No. 1 plates, the Lower-Intermediate Shell No. 2 plates, the axial welds BA, BB, BC, BD, BE, and BF, the circumferential weld AB, the N16 WLI nozzles, and the N17 LPCI nozzles and welds. The 57 EFPY 1/4 T fluence values determined using plant-specific attenuation were used since they were higher than the 1/4 T values determined using the generic attenuation methods from Regulatory Guide 1.99, Revision 2. The 57 EFPY USE values for the beltline materials were determined using methods consistent with Regulatory Guide 1.99, Revision 2. Position 1.2 of Regulatory Guide 1.99, Revision 2 was used for all materials except for weld heat 5P6756 from the Integrated Surveillance Program, which is the only material applicable for LGS that has credible surveillance data. Position 2.2 was used to compute the USE value for weld heat 5P6756. The 57 EFPY Transverse USE values shown in the next to last column in each table are the results used to demonstrate compliance.

Tables 4.2.2-1 and 4.2.2-2 summarize the 57 EFPY USE calculations for Unit 1 and Unit 2, respectively. The 57 EFPY USE values for Unit 1 and 2 beltline materials were determined to remain within the limits of 10 CFR 50 Appendix G requirements, either by having USE values of at least 50 ft-lb or through an equivalent margins analysis (EMA). Materials with 57 EFPY USE values less than 50 ft-lbs were evaluated using the Equivalent Margins Analysis methodology provided in BWROG-94037, "BWR Owners' Group Topical Report on Upper Shelf Energy Equivalent Margin Analysis – Approved Version," March 21, 1994 (Reference 4.7.4) and NEDO-32205-A, Revision 1, "10 CFR 50, Appendix G, Equivalent Margin Analysis for Low Upper Shelf Energy in BWR/2 through BWR/6 Vessels," February 1994 (Reference 4.7.5). For these materials with 57 EFPY USE values below 50 ft-lbs, the last column in each table compares the plant-specific 57 EFPY percentage to a percentage on the right that is the acceptable limit from the previously approved EMA. Each of the plant-specific 57 EFPY EMA results are bounded by those provided in the EMA.

10 CFR 50, Appendix G, requires evaluation of USE for reactor vessel beltline ferritic materials. The N16 nozzle forging and welds are fabricated from nickel Alloy 600, which is not a ferritic material. However, the surrounding Lower-Intermediate Shell No. 2 plate is evaluated for USE at this location using the fluence at the nozzle. The nickel alloy nozzle welds do not require evaluation.

The N17 LPCI nozzles are ferritic forgings that have been demonstrated to maintain over 50 ft-lb of USE at 57 EFPY. The N17 LPCI nozzle welds were evaluated using the methodology from Regulatory Guide 1.161, "Evaluation of Reactor Pressure Vessels with Charpy Upper-Shelf Energy Less Than 50 ft-lb," June, 1995 and from ASME Section XI, 1992 Edition, 1993 Addenda, Appendix K, "Assessment of Reactor Vessels with Low Upper Shelf Charpy Impact Energy Levels."

There are additional 57 EFPY USE values reported in Tables 4.2.2-1 and 4.2.2-2 beyond those for the beltline materials described above. LGS participates in the BWR Vessel and Internals Project (BWRVIP) Integrated Surveillance Program (ISP), as described in Reactor Surveillance program (B.2.21). 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. BWRVIP-135, Revision 1, "Integrated Surveillance Program (ISP) Data Source Book and Plant Evaluations," provided new information on surveillance capsules in the ISP that represent LGS plates and welds. These materials have also been satisfactorily evaluated for the period of extended operation, as shown in Tables 4.2.2-1 and 4.2.2-2.

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
Unit 1 - 57 EFPY (60-Year) Upper Shelf Energy (USE)

Location	Heat No.	Lot No.	Test Temp (ºF)	% Shear	Initial Longitudinal USE (ft-lb)	Initial Transverse USE (ft-lb) [1]	% Copper	57 EFPY 1/4 T Fluence (n/cm^2)	% Decrease in USE [2]	57 EFPY Transverse USE (ft-lb) [3]	57 EFPY Equivalent Margin Analysis Results [4,6]
PLATES – LOWER SHELL #1:											
14-1	C7688-1	N/A	40	50	85	55.3	0.12	5.7 E+17	11	49	11% < 21%
14-2	C7698-2	N/A	40	50	100	65	0.11	5.7 E+17	10.5	58	N/A
14-3	C7688-2	N/A	40	70	104	67.6	0.12	5.7 E+17	11	60	N/A
PLATES – LOWER-INTERMEDIATE SHELL #2:											
17-1	C7689-1	N/A	40	60	93	60.5	0.11	7.8 E+17	11	54	N/A
17-2	C7677-1	N/A	40	40	71	46.2	0.11	7.8 E+17	11	41	11% < 21%
17-3	C7698-1	N/A	40	50	96	62.4	0.11	7.8 E+17	11	56	N/A
WELDS – VERTICAL (AXIAL):											
BE	411A3531	H004A27A	10	60	N/A	68	0.02	6.2 E+17	7.5	63	N/A
BA	06L165	F017A27A	10	70	N/A	62	0.03	4.1 E+17	7.5	57	N/A
BB	06L165	F017A27A	10	70	N/A	62	0.03	4.0 E+17	7.5	57	N/A
BD	06L165	F017A27A	10	70	N/A	62	0.03	6.2 E+17	8.5	57	N/A
BF	06L165	F017A27A	10	70	N/A	62	0.03	5.5 E+17	8	57	N/A
BA	662A746	H013A27A	-20	65	N/A	95	0.03	4.1 E+17	7.5	88	N/A

Table 4.2.2-1
Unit 1 - 57 EFPY (60-Year) Upper Shelf Energy (USE)

Location	Heat No.	Lot No.	Test Temp (ºF)	% Shear	Initial Longitudinal USE (ft-lb)	Initial Transverse USE (ft-lb) [1]	% Copper	57 EFPY 1/4 T Fluence (n/cm^2)	% Decrease in USE [2]	57 EFPY Transverse USE (ft-lb) [3]	57 EFPY Equivalent Margin Analysis Results [4,6]
BD	662A746	H013A27A	-20	65	N/A	95	0.03	6.2 E+17	8.5	87	N/A
BE	662A746	H013A27A	-20	65	N/A	95	0.03	6.2 E+17	8.5	87	N/A
BF	662A746	H013A27A	-20	65	N/A	95	0.03	5.5 E+17	8	87	N/A
BA	3P4000 [7]	3932-989	10	80	N/A	97	0.02	4.1 E+17	7	90	N/A
BB	3P4000 [7]	3932-989	10	80	N/A	97	0.02	4.0 E+17	7	90	N/A
BC	3P4000 [7]	3932-989	10	80	N/A	97	0.02	5.1 E+17	7	90	N/A
BF	S3986 [7]	RUN934	10	40	N/A	51	0.06	5.5 E+17	10.5	46	18% < 34%
BA	1P4218 [7]	3929-989	10	83	N/A	102	0.05	4.1 E+17	9.5	92	N/A
BB	1P4218 [7]	3929-989	10	83	N/A	102	0.05	4.0 E+17	9.5	92	N/A
BE	1P4218 [7]	3929-989	10	83	N/A	102	0.05	6.2 E+17	10.5	91	N/A
TEST PLATE:											
Test Plate	421A6811	F022A27A	10	75	N/A	91	0.09	7.8 E+17	13	79	N/A
WELDS – GIRTH (CIRCUMFERENTIAL):											
AB	07L857	B101A27A	10	50	N/A	39	0.03	5.7 E+17	8.5	36	18% < 34%

Table 4.2.2-1
Unit 1 - 57 EFPY (60-Year) Upper Shelf Energy (USE)

Location	Heat No.	Lot No.	Test Temp (ºF)	% Shear	Initial Longitudinal USE (ft-lb)	Initial Transverse USE (ft-lb) [1]	% Copper	57 EFPY 1/4 T Fluence (n/cm^2)	% Decrease in USE [2]	57 EFPY Transverse USE (ft-lb) [3]	57 EFPY Equivalent Margin Analysis Results [4,6]
AB	402C4371	C115A27A	10	70	N/A	92	0.02	5.7 E+17	7.5	85	N/A
AB	411A3531	H004A27A	10	60	N/A	68	0.02	5.7 E+17	7.5	63	N/A
AB	09M057	C109A27A	10	50	N/A	44	0.03	5.7 E+17	8.5	40	18% < 34%
AB	412P3611	J417B27AF	130	100	N/A	136	0.03	5.7 E+17	8.5	124	N/A
AB	03M014	C118A27A	10	40	N/A	47	0.01	5.7 E+17	6.0	44	18% < 34%
AB	L83355	S411B27AD	130	100	N/A	150	0.03	5.7 E+17	8.5	137	N/A
AB	640892	J424B27AE	130	100	N/A	118	0.09	5.7 E+17	12	104	N/A
AB	401P6741	S419B27AG	130	100	N/A	136	0.03	5.7 E+17	8.5	124	N/A
AB	5P6756 [7]	N/A	0	100	N/A	121	0.08	5.7 E+17	11.5	107	N/A
N16 WATER LEVEL INSTRUMENTATION (WLI) NOZZLE FORGINGS:											
N16-0°	SB166	[5]	40	40	71	46.2	0.11	1.0 E+17	7.0	43	8.5% < 21%
N16-100°	SB166	[5]	40	40	71	46.2	0.11	1.4 E+17	7.5	43	8.5% < 21%
N16-200°	SB166	[5]	40	40	71	46.2	0.11	2.4 E+17	8.5	42	8.5% < 21%
N16-280°	SB166	[5]	40	40	71	46.2	0.11	1.4 E+17	7.5	43	8.5% < 21%

Table 4.2.2-1
Unit 1 - 57 EFPY (60-Year) Upper Shelf Energy (USE)

Location	Heat No.	Lot No.	Test Temp (ºF)	% Shear	Initial Longitudinal USE (ft-lb)	Initial Transverse USE (ft-lb) [1]	% Copper	57 EFPY 1/4 T Fluence (n/cm^2)	% Decrease in USE [2]	57 EFPY Transverse USE (ft-lb) [3]	57 EFPY Equivalent Margin Analysis Results [4,6]
N17 LOW PRESSURE COOLANT INJECTION (LPCI) NOZZLE FORGINGS:											
Forging-45°	Q2Q25W	N/A	N/A	N/A	N/A	70 [11]	0.18	3.4 E+17	12.5	61	N/A
Forging-135°	Q2Q35W	N/A	N/A	N/A	N/A	70 [11]	0.18	3.4 E+17	12.5	61	N/A
Forging-225°	Q2Q25W	N/A	N/A	N/A	N/A	70 [11]	0.18	3.4 E+17	12.5	61	N/A
Forging-315°	Q2Q35W	N/A	N/A	N/A	N/A	70 [11]	0.18	3.4 E+17	12.5	61	N/A
N17 LPCI NOZZLE-TO-SHELL WELDS											
KA	07L669	K004A27A	10	40	N/A	73 [12]	0.03	3.4 E+17	7.5	68	N/A
KA	401Z9711	A022A27A	10	80	N/A	73 [12]	0.02	3.4 E+17	6.5	68	N/A
KA	411A3531	H004A27A	10	60	N/A	73 [12]	0.02	3.4 E+17	6.5	68	N/A
KA	662A746	H013A27A	-20	65	N/A	73 [12]	0.03	3.4 E+17	7.5	68	N/A
KA	3P4000	3932-989	10	80	N/A	73 [12]	0.02	3.4 E+17	6.5	68	N/A
KA	S3986	RUN934	10	40	N/A	73 [12]	0.06	3.4 E+17	9.5	66	N/A
BEST – ESTIMATE CHEMISTRIES PER BWRVIP – 135, REVISION 1: [10]											
BA	3P4000	3932-989	10	N/A	N/A	97	0.02	4.1 E+17	7.0	90	N/A

Table 4.2.2-1
Unit 1 - 57 EFPY (60-Year) Upper Shelf Energy (USE)

Location	Heat No.	Lot No.	Test Temp (ºF)	% Shear	Initial Longitudinal USE (ft-lb)	Initial Transverse USE (ft-lb) [1]	% Copper	57 EFPY 1/4 T Fluence (n/cm^2)	% Decrease in USE [2]	57 EFPY Transverse USE (ft-lb) [3]	57 EFPY Equivalent Margin Analysis Results [4,6]
BB	3P4000	3932-989	10	N/A	N/A	97	0.02	4.0 E+17	7.0	90	N/A
BC	3P4000	3932-989	10	N/A	N/A	97	0.02	5.1 E+17	7.0	90	N/A
BF	S3986	RUN934	10	N/A	N/A	51	0.06	5.5 E+17	10.5	46	18% < 34%
BA	1P4218	3929-989	10	N/A	N/A	102	0.06	4.1 E+17	9.5	92	N/A
BB	1P4218	3929-989	10	N/A	N/A	102	0.06	4.0 E+17	9.5	92	N/A
BE	1P4218	3929-989	10	N/A	N/A	102	0.06	6.2 E+17	10.5	91	N/A
AB	5P6756	N/A	0	N/A	N/A	104.4	0.08	5.7 E+17	11.5	92	N/A
INTEGRATED SURVEILLANCE PROGRAM (ISP):											
Plate	C2761-2	N/A	N/A	N/A	N/A	127.2	0.10	7.8 E+17	10.5	114	N/A
Weld	5P6756 [9]	N/A	N/A	N/A	N/A	104.4	0.06/ 0.08 [8]	5.7E+17	11.5	92	N/A

NOTES:

[1] Transverse USE for plate and forging materials is obtained using 65 percent of the longitudinal USE.

[2] USE Decrease is obtained from Regulatory Guide 1.99, Revision 2, Figure 2.

[3] 57 EFPY Transverse USE = Initial Transverse USE * [1 – (% Decrease in USE/100)]

[4] The initial USE for the materials evaluated in this column is very low due to a lack of sufficient test data. The column demonstrates that these materials are bounded by an Equivalent Margins Analysis.

[5] The N16 nozzle forging and welds are fabricated from nickel Alloy 600, which is not a ferritic material and therefore does not require evaluation for loss of fracture toughness. However, the plate at this location is evaluated for USE using the fluence at the nozzle and the limiting material properties of the surrounding Lower-Intermediate Shell No. 2 plate. The EMA for the N16 - 200° location is shown as bounding for all four N16 locations. The N16 welds do not require evaluation.

[6] Where percentages are shown, the values to the right have been determined using NEDO-32205-A (Reference 4.7.5) and BWROG-94037 (Reference 4.7.4). The weld materials required adjustment because the measured results exceeded Regulatory Guide 1.99, Revision 2 predicted results.

[7] The original plant-specific chemistry values for this material are shown here but the best-estimate chemistry values from BWRVIP-135, Revision 1 for this material are provided in Table 4.2.2-1. It is intended that the best-estimate chemistries supersede the plant-specific chemistries.

[8] The first %Cu value is from Appendix B of BWRVIP-135, Revision 1; the second value is from Appendix D and represents the best estimate chemistry. The bounding value (Appendix D) is used in this evaluation.

[9] Integrated Surveillance Program weld heat 5P6756 is the only material applicable for LGS that has credible surveillance data and is the only material for which Position 2.2 of Regulatory Guide 1.99, Revision 2 was used to compute the USE value. Position 1.2 was used for all other materials.

[10] It is intended that the best-estimate chemistries supersede the plant-specific chemistries.

[11] The values shown here are not the plant-specific initial USE values, but were derived from a review of industry databases for SA-508-2 forging materials. The initial CVN value of 70 ft-lb was accepted as representative for LGS N-17 nozzle forgings by the NRC in the Safety Evaluation for the 1.65 percent power uprate (Reference 4.7.9).

[12] The Safety Evaluation Report for the Measurement Uncertainty Recapture Power Uprate (Reference 4.7.9) Section 3.9.3, states that the NRC reviewed the CMTR CVN data for the LGS, Units 1 and 2, LPCI nozzle weld materials and concluded that it would be conservative to assume an initial USE value of 73 ft-lb for the LGS Units 1 and 2 SMAW materials instead of the initial USE values resulting from testing performed at temperatures lower than 40 degrees F.

Table 4.2.2-2
Unit 2 - 57 EFPY (60-Year) Upper Shelf Energy (USE)

Location	Heat No.	Lot No.	Test Temp (ºF)	% Shear	Initial Longitudinal USE (ft-lb)	Initial Transverse USE (ft-lb) [1]	% Copper	57 EFPY 1/4 T Fluence (n/cm^2)	% Decrease in USE [2]	57 EFPY Transverse USE (ft-lb) [3]	57 EFPY Equivalent Margin Analysis Results [4,6]
PLATES – LOWER SHELL #1:											
14-1	B3312-1	N/A	40	50	78	50.7	0.13	5.5 E+17	11.5	45	11.5% < 21%
14-2	B3416-1	N/A	40	50	61	39.7	0.14	5.5 E+17	12	35	12% < 21%
14-3	C9621-2	N/A	40	30	89	57.9	0.15	5.5 E+17	12.5	51	N/A
PLATES – LOWER-INTERMEDIATE SHELL #2:											
17-1	C9569-2	N/A	40	40	87	56.6	0.11	7.6 E+17	11	50	N/A
17-2	C9526-1	N/A	40	40	89	57.9	0.11	7.6 E+17	11	52	N/A
17-3	C9526-2	N/A	40	50	97	63.1	0.11	7.6 E+17	11	56	N/A
WELDS – VERTICAL (AXIAL):											
BA	432A2671	H019A27A	-20	40	N/A	54	0.04	3.7 E+17	8.5	49	18% < 34%
BB	432A2671	H019A27A	-20	40	N/A	54	0.04	4.0 E+17	8.5	49	18% < 34%
BD	432A2671	H019A27A	-20	40	N/A	54	0.04	6.1 E+17	9.5	49	18% < 34%
BE	432A2671	H019A27A	-20	40	N/A	54	0.04	6.1 E+17	9.5	49	18% < 34%
BF	432A2671	H019A27A	-20	40	N/A	54	0.04	5.3 E+17	9	49	18% < 34%
BA	03R728	L910A27A	10	70	N/A	72	0.03	3.7 E+17	7.5	67	N/A
BC	03R728	L910A27A	10	70	N/A	72	0.03	5.0 E+17	8	66	N/A

Table 4.2.2-2
Unit 2 - 57 EFPY (60-Year) Upper Shelf Energy (USE)

Location	Heat No.	Lot No.	Test Temp (ºF)	% Shear	Initial Longitudinal USE (ft-lb)	Initial Transverse USE (ft-lb) [1]	% Copper	57 EFPY 1/4 T Fluence (n/cm^2)	% Decrease in USE [2]	57 EFPY Transverse USE (ft-lb) [3]	57 EFPY Equivalent Margin Analysis Results [4,6]
BA	3P4000 (single wire)	3933 [7]	10	80	N/A	95	0.02	3.7 E+17	6.5	89	N/A
BB	3P4000 (single wire)	3933 [7]	10	80	N/A	95	0.02	4.0 E+17	6.5	89	N/A
BC	3P4000 (single wire)	3933 [7]	10	80	N/A	95	0.02	5.0 E+17	7	88	N/A
BD	3P4000 (single wire)	3933 [7]	10	80	N/A	95	0.02	6.1 E+17	7.5	88	N/A
BE	3P4000 (single wire)	3933 [7]	10	80	N/A	95	0.02	6.1 E+17	7.5	88	N/A
BF	3P4000 (single wire)	3933 [7]	10	80	N/A	95	0.02	5.3 E+17	7	88	N/A
BA	3P4000 (tandem wire)	3933 [7]	10	98	N/A	91	0.02	3.7 E+17	6.5	85	N/A
BB	3P4000 (tandem wire)	3933 [7]	10	98	N/A	91	0.02	4.0 E+17	6.5	85	N/A
BC	3P4000 (tandem wire)	3933 [7]	10	98	N/A	91	0.02	5.0 E+17	7	85	N/A
BD	3P4000 (tandem wire)	3933 [7]	10	98	N/A	91	0.02	6.1 E+17	7.5	84	N/A
BE	3P4000 (tandem wire)	3933 [7]	10	98	N/A	91	0.02	6.1 E+17	7.5	84	N/A

Table 4.2.2-2
Unit 2 - 57 EFPY (60-Year) Upper Shelf Energy (USE)

Location	Heat No.	Lot No.	Test Temp (ºF)	% Shear	Initial Longitudinal USE (ft-lb)	Initial Transverse USE (ft-lb) [1]	% Copper	57 EFPY 1/4 T Fluence (n/cm^2)	% Decrease in USE [2]	57 EFPY Transverse USE (ft-lb) [3]	57 EFPY Equivalent Margin Analysis Results [4,6]
BF	3P4000 (tandem wire)	3933 [7]	10	98	N/A	91	0.02	5.3 E+17	7	85	N/A
BB	401Z9711	A022A27A	10	80	N/A	104	0.02	4.0 E+17	6.5	97	N/A
BC	662A746	H013A27A	-20	65	N/A	95	0.03	5.0 E+17	8	87	N/A
BC	402A0462	B023A27A	10	62	N/A	86	0.02	5.0 E+17	7	80	N/A
BD	09L853	A111A27A	10	60	N/A	79	0.03	6.1 E+17	8.5	72	N/A
BE	09L853	A111A27A	10	60	N/A	79	0.03	6.1 E+17	8.5	72	N/A
BC	07L669	K004A27A	-20	40	N/A	54	0.03	5.0 E+17	8	50	18% < 34%
BD	07L669	K004A27A	-20	40	N/A	54	0.03	6.1 E+17	8.5	49	18% < 34%
BE	07L669	K004A27A	-20	40	N/A	54	0.03	6.1 E+17	8.5	49	18% < 34%
BF	07L669	K004A27A	-20	40	N/A	54	0.03	5.3 E+17	8	50	18% < 34%
WELDS – GIRTH (CIRCUMFERENTIAL):											
AB	07L857	B101A27A	10	50	N/A	39	0.03	5.5 E+17	8	36	17.5% < 34%
AB	L83355	S411B27AD	130	100	N/A	150	0.03	5.5 E+17	8	138	N/A
AB	402C4371	C115A27A	10	70	N/A	92	0.02	5.5 E+17	7	86	N/A
AB	03M014	C118A27A	10	40	N/A	47	0.01	5.5 E+17	5.5	44	17.5% < 34%

Table 4.2.2-2
Unit 2 - 57 EFPY (60-Year) Upper Shelf Energy (USE)

Location	Heat No.	Lot No.	Test Temp (ºF)	% Shear	Initial Longitudinal USE (ft-lb)	Initial Transverse USE (ft-lb) [1]	% Copper	57 EFPY 1/4 T Fluence (n/cm^2)	% Decrease in USE [2]	57 EFPY Transverse USE (ft-lb) [3]	57 EFPY Equivalent Margin Analysis Results [4,6]
AB	411A3531	H004A27A	10	60	N/A	68	0.02	5.5 E+17	7	63	N/A
AB	09M057	C109A27A	10	50	N/A	44	0.03	5.5 E+17	8	40	17.5% < 34%
AB	640892	J424B27AE	130	100	N/A	118	0.09	5.5 E+17	12	104	N/A
AB	401P6741	S419B27AG	130	100	N/A	136	0.03	5.5 E+17	8	125	N/A
AB	412P3611	J417B27AF	130	100	N/A	136	0.03	5.5 E+17	8	125	N/A
N16 WATER LEVEL INSTRUMENTATION (WLI) NOZZLE FORGINGS:											
N16-0º	SB-166	[5]	40	40	87	56.6	0.11	1.0 E+17	7	53	N/A
N16-100º	SB-166	[5]	40	40	87	56.6	0.11	1.4 E+17	7.5	52	N/A
N16-200º	SB-166	[5]	40	40	87	56.6	0.11	2.4 E+17	8.5	52	N/A
N16-280º	SB-166	[5]	40	40	87	56.6	0.11	1.4 E+17	7.5	52	N/A
N17 LOW PRESSURE COOLANT INJECTION (LPCI) NOZZLE FORGINGS:											
892L-1	Q2Q33W	N/A	N/A	N/A	N/A	70 [12]	0.18	3.3 E+17	12.5	61	N/A
892L-2	Q2Q33W	N/A	N/A	N/A	N/A	70 [12]	0.18	3.3 E+17	12.5	61	N/A
892L-3	Q2Q33W	N/A	N/A	N/A	N/A	70 [12]	0.18	3.3 E+17	12.5	61	N/A
892L-4	Q2Q33W	N/A	N/A	N/A	N/A	70 [12]	0.18	3.3 E+17	12.5	61	N/A

Table 4.2.2-2
Unit 2 - 57 EFPY (60-Year) Upper Shelf Energy (USE)

Location	Heat No.	Lot No.	Test Temp (ºF)	% Shear	Initial Longitudinal USE (ft-lb)	Initial Transverse USE (ft-lb) [1]	% Copper	57 EFPY 1/4 T Fluence (n/cm^2)	% Decrease in USE [2]	57 EFPY Transverse USE (ft-lb) [3]	57 EFPY Equivalent Margin Analysis Results [4,6]
N17 LPCI NOZZLE-TO-SHELL WELDS:											
KA	C3L46C	J020A27A	10	60	N/A	73 [13]	0.02	3.3 E+17	6.5	68	N/A
KA	422B7201	L030A27A	-20	30	N/A	73 [13]	0.04	3.3 E+17	8	67	N/A
KA	4P4784 (single wire)	3930	40	90	N/A	97	0.06	3.3 E+17	9.5	88	N/A
KA	4P4784 (tandem wire)	3930	40	75	N/A	95	0.06	3.3 E+17	9.5	86	N/A
KA	07L669	K004A27A	-20	40	N/A	73 [13]	0.03	3.3 E+17	7.5	68	N/A
KA	09L853	A111A27A	10	60	N/A	73 [13]	0.03	3.3 E+17	7.5	68	N/A
KA	432A2671	H019A27A	-20	40	N/A	73 [13]	0.04	3.3 E+17	8	67	N/A
BEST – ESTIMATE CHEMISTRIES PER BWRVIP – 135, REVISION 1: [11]											
BA	3P4000 (single wire)	3933	10	80	N/A	95	0.02	3.7 E+17	6.5	89	N/A
BB	3P4000 (single wire)	3933	10	80	N/A	95	0.02	4.0 E+17	6.5	89	N/A
BC	3P4000 (single wire)	3933	10	80	N/A	95	0.02	5.0 E+17	7	88	N/A
BD	3P4000 (single wire)	3933	10	80	N/A	95	0.02	6.1 E+17	7.5	88	N/A

Table 4.2.2-2
Unit 2 - 57 EFPY (60-Year) Upper Shelf Energy (USE)

Location	Heat No.	Lot No.	Test Temp (ºF)	% Shear	Initial Longitudinal USE (ft-lb)	Initial Transverse USE (ft-lb) [1]	% Copper	57 EFPY 1/4 T Fluence (n/cm^2)	% Decrease in USE [2]	57 EFPY Transverse USE (ft-lb) [3]	57 EFPY Equivalent Margin Analysis Results [4,6]
BE	3P4000 (single wire)	3933	10	80	N/A	95	0.02	6.1 E+17	7.5	88	N/A
BF	3P4000 (single wire)	3933	10	80	N/A	95	0.02	5.3 E+17	7	88	N/A
BA	3P4000 (tandem wire)	3933	10	98	N/A	91	0.02	3.7 E+17	6.5	85	N/A
BB	3P4000 (tandem wire)	3933	10	98	N/A	91	0.02	4.0 E+17	6.5	85	N/A
BC	3P4000 (tandem wire)	3933	10	98	N/A	91	0.02	5.0 E+17	7	85	N/A
BD	3P4000 (tandem wire)	3933	10	98	N/A	91	0.02	6.1 E+17	7.5	84	N/A
BE	3P4000 (tandem wire)	3933	10	98	N/A	91	0.02	6.1 E+17	7.5	84	N/A
BF	3P4000 (tandem wire)	3933	10	98	N/A	91	0.02	5.3 E+17	7	85	N/A
Weld [9]	CTY538	A027A27A	10	70	94	61	0.03	7.6 E+17	9	56	N/A
Weld	5P6756	N/A	N/A	N/A	N/A	104.4	0.08	5.5 E+17	11.5	92	N/A

Table 4.2.2-2
Unit 2 - 57 EFPY (60-Year) Upper Shelf Energy (USE)

Location	Heat No.	Lot No.	Test Temp (ºF)	% Shear	Initial Longitudinal USE (ft-lb)	Initial Transverse USE (ft-lb) [1]	% Copper	57 EFPY 1/4 T Fluence (n/cm^2)	% Decrease in USE [2]	57 EFPY Transverse USE (ft-lb) [3]	57 EFPY Equivalent Margin Analysis Results [4,6]
INTEGRATED SURVEILLANCE PROGRAM (ISP):											
Plate	B0673-1	N/A	N/A	N/A	N/A	158.1	0.15	7.6 E+17	13.5	137	N/A
Weld	5P6756 [10]	N/A	N/A	N/A	N/A	104.4	0.06/0.08 [8]	5.5 E+17	11.5	92	N/A

NOTES:

[1] Transverse USE for plate and forging materials is obtained using 65 percent of the longitudinal USE.

[2] USE Decrease is obtained from Regulatory Guide 1.99, Revision 2, Figure 2.

[3] 57 EFPY Transverse USE = Initial Transverse USE * [1 – (% Decrease in USE/100)]

[4] The initial USE for the materials evaluated in this column is very low due to a lack of sufficient test data. The column demonstrates that these materials are bounded by an Equivalent Margins Analysis. The weld materials required adjustment because the measured decrease exceeds the predicted decrease. This has been performed in accordance with RG 1.99, Revision 2.

[5] The N16 nozzle forging and welds are fabricated from nickel Alloy 600, which is not a ferritic material and therefore does not require evaluation for loss of fracture toughness. However, the plate at this location is evaluated for USE using the fluence at the nozzle and the limiting material properties of the surrounding Lower-Intermediate Shell No. 2 plate. The EMA for the N16 - 200° location is shown as bounding for all four N16 locations. The N16 welds do not require evaluation.

[6] Where percentages are shown, the values to the right have been determined using NEDO-32205-A (Reference 4.7.5) and BWROG-94037 (Reference 4.7.4). The weld materials required adjustment because the measured results exceeded Regulatory Guide 1.99, Revision 2 predicted results.

[7] The original plant-specific chemistry values for this material are shown here but the best-estimate chemistry values from BWRVIP-135, Revision 1 are provided in Table 4.2.2-2 for this material. It is intended that the best-estimate chemistries supersede the plant-specific chemistries.

[8] The first Percent Copper value is from Appendix B of BWRVIP-135, Revision 1. The second value is from Appendix D and represents the best estimate chemistry. The bounding value (Appendix D) is used in this evaluation.

[9] CMTR records do not indicate that this is a surveillance weld. However, the CMTRs demonstrate that this heat is a weld in the vessel; therefore it is evaluated using the best estimate chemistry from BWRVIP-135, Revision 1.

[10] Integrated Surveillance Program weld heat 5P6756 is the only material applicable for LGS that has credible surveillance data and is the only material for which Position 2.2 of Regulatory Guide 1.99, Revision 2 was used to compute the USE value. Position 1.2 was used for all other materials.

[11] It is intended that the best-estimate chemistries supersede the plant-specific chemistries.

[12] The values shown here are not the plant-specific initial USE values, but were derived from a review of industry databases for SA-508-2 forging materials. The initial CVN value of 70 ft-lb was accepted as representative for LGS N-17 nozzle forgings by the NRC in the Safety Evaluation for the 1.65 percent power uprate (Reference 4.7.9).

[13] The Safety Evaluation Report for the Measurement Uncertainty Recapture Power Uprate (Reference 4.7.9), Section 3.9.3, states that the NRC reviewed the CMTR CVN data for the LGS, Units 1 and 2, LPCI nozzle weld materials and concluded that it would be conservative to assume an initial USE value of 73 ft-lb for the LGS Units 1 and 2 SMAW materials instead of the initial USE values resulting from testing performed at temperatures lower than 40 degrees F.

4.2.3 ADJUSTED REFERENCE TEMPERATURE

TLAA Description:

The adjusted reference temperature (ART) of the limiting beltline material is used to adjust the beltline P-T limit curves to account for irradiation effects. Regulatory Guide 1.99, Revision 2 (Reference 4.7.3), provides the methodology for determining the ART of the limiting material. The initial nil-ductility reference temperature, RT_{NDT}, is the temperature at which a non-irradiated metal (ferritic steel) 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}) 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. Since the ΔRT_{NDT} value is a function of 32 EFPY fluence, 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:

As described in Section 4.2.1, 57 EFPY fluence values were determined for LGS for the RPV beltline components. The 57 EFPY 1/4 T fluence values determined using plant-specific attenuation were used since they were higher than the 1/4 T values determined using the generic attenuation methods from Regulatory Guide 1.99, Revision 2. ART values were computed in accordance with RG 1.99, Revision 2. Table 4.2.3-1 provides the 57 EFPY ART results for Unit 1 Lower Shell No. 1 plates, Lower-Intermediate Shell No. 2 plates, axial welds BA, BB, BC, BD, BE, BF, and circumferential weld AB.

10 CFR 50, Appendix G, requires evaluation of ART for reactor vessel beltline ferritic materials. The N16 nozzle forging and welds are fabricated from nickel Alloy 600, which is not a ferritic material. However, this location is evaluated for ART using the fluence at the nozzle and the limiting material properties (chemistry and initial RT_{NDT}) of the surrounding Lower-Intermediate Shell No. 2 plate. The N17 LPCI nozzles are ferritic forgings. Table 4.2.3-2 provides the 57 EFPY ART results for Unit 1 N16 WLI nozzles and for the N17 LPCI nozzles and welds.

57 EFPY ART values are also provided for best-estimate chemistry values from BWRVIP-135, Revision 1 (Reference 4.7.8) data, which supersede plant-specific values where available, as noted. 57 EFPY ART values are also computed for Integrated Surveillance Program plate and weld material from BWRVIP-135, Revision 1. The results for the plate material are provided for information only since the ISP plate material is not the same heat as the target vessel plate material. The ISP weld material does occur in the beltline region, so the ART results are considered applicable for Unit 1. BWRVIP-135, Revision 2 (Reference 4.7.10) has been issued but it did not change relevant data for LGS.

Table 4.2.3-3 provides the 57 EFPY ART results for Unit 2 Lower Shell No. 1 plates, Lower-Intermediate Shell No. 2 plates, axial welds BA, BB, BC, BD, BE, BF, and circumferential weld AB.

Table 4.2.3-4 provides the 57 EFPY ART results for Unit 2 N16 WLI nozzles, N17 LPCI nozzles and welds. In addition, 57 EFPY ART values are computed for best-estimate chemistry values from BWRVIP-135, Revision 1 data, which are considered to supersede plant-specific values where available, as noted. It also includes 57 EFPY ART values computed for Integrated Surveillance Program plate and weld material from BWRVIP-135, Revision 1.

The ART values of the limiting beltline materials at 57 EFPY for each unit remain below 200 degrees F, which is the Nil-Ductility Transition (RT_{NDT}) limit specified in NRC Regulatory Guide 1.99, Revision 2, Section 3. The limiting locations are listed below.

Unit 1 ART Results:

- The limiting 57 EFPY ART value for Unit 1 is 74ºF, computed for shell 17-2, plate heat C7677-1.
- The limiting 57 EFPY ART value for the Unit 1 N16 WLI nozzle is 48ºF, computed based upon the material properties of the surrounding shell 17-2 plate material heat C7677-1 since the nozzle forging material is SB-166 nickel alloy material which does not require evaluation.
- The limiting 57 EFPY ART value for the Unit 1 N17 LPCI nozzle is 61ºF, computed for forging heat Q2Q25W.
- The 57 EFPY ART value for the Unit 1 ISP weld material is 16ºF, computed for weld heat 5P6756.

Unit 2 ART Results:

- The limiting 57 EFPY ART value for Unit 2 is 102ºF, computed for plate heat B3416-1.
- The limiting 57 EFPY ART value for the Unit 2 N16 WLI nozzle is 38ºF, computed based upon the material properties of the surrounding shell 17-2 plate material heat C9526-1 since the nozzle forging material is SB-166 nickel alloy material which does not require evaluation.
- The limiting 57 EFPY ART value for the Unit 2 N17 LPCI nozzle is 61ºF, computed for forging heat Q2Q33W.
- The 57 EFPY ART value for the Unit 2 ISP weld material is 69ºF, computed for weld heat 5P6756.

TLAA Disposition: 10 CFR 54.21(c)(1)(ii) – The ART analyses have been projected to the end of the period of extended operation. They may be used as inputs to 57 EFPY P-T limits for the period of extended operation.

Table 4.2.3-1
Unit 1 57 EFPY Adjusted Reference Temperature (ART) Values for Beltline Plates and Welds

Beltline I.D.	Heat No.	Lot No.	% Cu	% Ni	CF	Initial RT_{NDT}	57 EFPY 1/4 T Fluence (n/cm^2)	ΔRT_{NDT} (ºF)	Sigma-i	Sigma-Δ	Margin (ºF)	57 EFPY Shift (ºF)	57 EFPY 1/4 T ART (ºF)
PLATES – LOWER SHELL #1:													
14-1	C7688-1	N/A	0.12	0.51	81	10	5.7 E+17	25	0	13	25	51	61
14-2	C7698-2	N/A	0.11	0.48	73	10	5.7 E+17	23	0	11	23	46	56
14-3	C7688-2	N/A	0.12	0.51	81	10	5.7 E+17	25	0	13	25	51	61
PLATES – LOWER-INTERMEDIATE SHELL #2:													
17-1	C7689-1	N/A	0.11	0.48	73	10	7.8 E+17	27	0	13	27	54	64
17-2	C7677-1	N/A	0.11	0.50	73	20	7.8 E+17	27	0	13	27	54	74
17-3	C7698-1	N/A	0.11	0.48	73	10	7.8 E+17	27	0	13	27	54	64
WELDS – AXIAL (VERTICAL) [1]**:**													
BE	411A3531	H004A27A	0.02	0.96	27	-50	6.2 E+17	9	0	4	9	18	-32
BA	06L165	F017A27A	0.03	0.99	41	-50	4.1 E+17	11	0	5	11	21	-29
BB	06L165	F017A27A	0.03	0.99	41	-50	4.0 E+17	11	0	5	11	21	-29
BD	06L165	F017A27A	0.03	0.99	41	-50	6.2 E+17	13	0	7	13	27	-23
BF	06L165	F017A27A	0.03	0.99	41	-50	5.5 E+17	13	0	6	13	25	-25
BA	662A746	H013A27A	0.03	0.88	41	-20	4.1 E+17	11	0	5	11	21	1

Table 4.2.3-1
Unit 1 57 EFPY Adjusted Reference Temperature (ART) Values for Beltline Plates and Welds

Beltline I.D.	Heat No.	Lot No.	% Cu	% Ni	CF	Initial RT_{NDT}	57 EFPY 1/4 T Fluence (n/cm^2)	Δ RT_{NDT} (ºF)	Sigma-i	Sigma-Δ	Margin (ºF)	57 EFPY Shift (ºF)	57 EFPY 1/4 T ART (ºF)
BD	662A746	H013A27A	0.03	0.88	41	-20	6.2 E+17	13	0	7	13	27	7
BE	662A746	H013A27A	0.03	0.88	41	-20	6.2 E+17	13	0	7	13	27	7
BF	662A746	H013A27A	0.03	0.88	41	-20	5.5 E+17	13	0	6	13	25	5
BA	3P4000	3392-989 [2]	0.02	0.93	27	-50	4.1 E+17	7	0	4	7	14	-36
BB	3P4000	3392-989 [2]	0.02	0.93	27	-50	4.0 E+17	7	0	4	7	14	-36
BC	3P4000	3392-989 [2]	0.02	0.93	27	-50	5.1 E+17	8	0	4	8	16	-34
BF	S3986	RUN 934 [2]	0.06	0.95	79	-42	5.5 E+17	24	0	12	24	49	7
BA	1P4218	3929-989 [2]	0.05	0.89	72	-50	4.1 E+17	19	0	9	19	38	-12
BB	1P4218	3929-989 [2]	0.05	0.89	72	-50	4.0 E+17	19	0	9	19	37	-13
BE	1P4218	3929-989 [2]	0.05	0.89	72	-50	6.2 E+17	24	0	12	24	47	-3
Test Plate	421A6811	F022A27A	0.09	0.81	122	-50	7.8 E+17	45	0	22	45	90	40
WELDS – GIRTH (CIRCUMFERENTIAL):													
AB	07L857	B101A27A	0.03	0.97	41	-6	5.7 E+17	13	0	6	13	26	20
AB	402C4371	C115A27A	0.02	0.92	27	-50	5.7 E+17	8	0	4	8	17	-33
AB	411A3531	H004A27A	0.02	0.96	27	-50	5.7 E+17	8	0	4	8	17	-33

Table 4.2.3-1
Unit 1 57 EFPY Adjusted Reference Temperature (ART) Values for Beltline Plates and Welds

Beltline I.D.	Heat No.	Lot No.	% Cu	% Ni	CF	Initial RT_{NDT}	57 EFPY 1/4 T Fluence (n/cm^2)	ΔRT_{NDT} (ºF)	Sigma-i	Sigma-Δ	Margin (ºF)	57 EFPY Shift (ºF)	57 EFPY 1/4 T ART (ºF)
AB	09M057	C109A27A	0.03	0.89	41	-36	5.7 E+17	13	0	6	13	26	-10
AB	412P3611	J417B27AF	0.03	0.93	41	-80	5.7 E+17	13	0	6	13	26	-54
AB	03M014	C118A27A	0.01	0.94	20	-34	5.7 E+17	6	0	3	6	13	-21
AB	L83355	S411B27AD	0.03	1.08	41	-70	5.7 E+17	13	0	6	13	26	-44
AB	640892	J424B27AE	0.09	1.00	122	-60	5.7 E+17	38	0	19	38	77	17
AB	401P6741	S419B27AG	0.03	0.92	41	-60	5.7 E+17	13	0	6	13	26	-34
AB	5P6756	N/A [2]	0.083	0.94	112	-60	5.7 E+17	35	0	18	35	70	10

NOTES:

[1] Welds BA, BB, and BC occur in the lower shell (Shell Ring #1) and welds BD, BE, and BF occur in the lower-intermediate shell (Shell Ring #2).

[2] The original plant-specific chemistry values for this material are shown here but the best-estimate chemistry values from BWRVIP-135, Revision 1 for this material are provided in Table 4.2.3-2. It is intended that the best-estimate chemistry values supersede the plant-specific chemistry values.

Table 4.2.3-2
Unit 1 57 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}	57 EFPY 1/4 T Fluence n/cm^2	ΔRT_{NDT}	Sigma-i	Sigma-Δ	Margin ºF	57 EFPY Shift ºF	57 EFPY 1/4 T ART ºF
N16 WATER LEVEL INSTRUMENTATION (WLI) NOZZLE FORGINGS:													
N16-0°	SB-166 [2]	N/A	0.11	0.50	73	20	1.0 E+17	8	0	4	8	16	36
N16-100°	SB-166 [2]	N/A	0.11	0.50	73	20	1.4 E+17	10	0	5	10	20	40
N16-200°	SB-166 [2]	N/A	0.11	0.50	73	20	2.4 E+17	14	0	7	14	28	48
N16-280°	SB-166 [2]	N/A	0.11	0.50	73	20	1.4 E+17	10	0	5	10	20	40
N17 LOW PRESSURE COOLANT INJECTION (LPCI) NOZZLE FORGINGS:													
N17-45°	Q2Q25W	N/A	0.18	0.85	142	-6	3.4 E+17	33	0	17	33	67	61
N17-135°	Q2Q35W	N/A	0.18	0.78	140	-8	3.4 E+17	33	0	16	33	66	58
N17-225°	Q2Q25W	N/A	0.18	0.85	142	-6	3.4 E+17	33	0	17	33	67	61
N17-315°	Q2Q35W	N/A	0.18	0.78	140	-8	3.4 E+17	33	0	16	33	66	58
N17 LPCI NOZZLE-TO-SHELL WELDS:													
KA	411A3531	H004A27A	0.02	0.96	27	-50	3.4 E+17	6	0	3	6	13	-37
KA	662A746	H013A27A	0.03	0.88	41	-20	3.4 E+17	10	0	5	10	19	-1
KA	3P4000 [8]	3932-989	0.02	0.928	27	-50	3.4 E+17	6	0	3	6	13	-37
KA	S3986 [8]	RUN934	0.06	0.95	79	-42	3.4 E+17	19	0	9	19	37	-5

Table 4.2.3-2
Unit 1 57 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}	57 EFPY 1/4 T Fluence n/cm^2	Δ RT_{NDT}	Sigma-i	Sigma-Δ	Margin ºF	57 EFPY Shift ºF	57 EFPY 1/4 T ART ºF
Weld	07L669	K004A27A	0.03	1.02	41	-50	3.4 E+17	10	0	5	10	19	-31
Weld	401Z9711	A022A27A	0.02	0.83	27	-50	3.4 E+17	6	0	3	6	13	-37
BEST-ESTIMATE CHEMISTRIES PER BWRVIP-135 R1 [1]**:**													
BA	3P4000	N/A	0.02	0.935	27	-50	4.1 E+17	7	0	4	7	14	-36
BB	3P4000	N/A	0.02	0.935	27	-50	4.0 E+17	7	0	4	7	14	-36
BC	3P4000	N/A	0.02	0.935	27	-50	5.1 E+17	8	0	4	8	16	-34
BF	S3986	N/A	0.06	0.949	79	-42	5.5 E+17	24	0	12	24	49	7
BA	1P4218	N/A	0.06	0.865	79	-50	4.1 E+17	21	0	10	21	41	-9
BB	1P4218	N/A	0.06	0.865	79	-50	4.0 E+17	21	0	10	21	41	-9
BE	1P4218	N/A	0.06	0.865	79	-50	6.2 E+17	26	0	13	26	52	2
AB	5P6756 [5]	N/A	0.08	0.936	108	-60	5.7 E+17	34	0	17	34	68	8
AB	5P6756 [5]	N/A	0.08	0.936	154 [6]	-60	5.7 E+17	48	0	14	28	76	16
ISP BWRVIP-135 R1 UPDATED ART TABLES:													
Plate	C2761-2 [3]	N/A	0.1	0.54	65 [7]	20	7.8 E+17	24	0	12	24	48	68
Weld	5P6756 [4]	N/A	0.06	0.936	154 [5]	-60	5.7 E+17	48	0	14	28	76	16

NOTES:

[1] The ART values computed for the best-estimate chemistries are intended to supersede the ART values computed using the plant-specific chemistries. BWRVIP-135, Revision 2 has been issued but contains no change to data for Limerick. Therefore, Revision 1 continues to be applicable for this evaluation.

[2] The N16 nozzle forging and welds are fabricated from nickel Alloy 600, which is not a ferritic material and therefore does not require evaluation for loss of fracture toughness. However, the plate at this location is evaluated for ART using the fluence at the nozzle and the limiting material properties (chemistry and initial RT_{NDT}) of the surrounding Lower-Intermediate Shell No. 2 plate. The N16 welds do not require evaluation.

[3] The ISP plate material is NOT the same heat as the target vessel plate material. The results are for information only and do not affect the P-T limits.

[4] The ISP weld material is not the same heat as the target vessel weld material. However, this heat does occur in the beltline region, so the material is evaluated as defined in Section 3 of BWRVIP-135, Revision 1 and is considered applicable to the beltline region.

[5] This heat is presented with the CF prior to adjustment (108) and after adjustment (154) in order to provide both sets of data.

[6] The adjusted CF is calculated as: (108/82) * 116.9 = 154ºF. Note that the first value provided represents the BWRVIP-135, Revision 1, Appendix B, best-estimate chemistry and it results in a CF = 82ºF. The second value represents the BWRVIP-135 R1 Appendix D best-estimate chemistry and results in a CF = 82ºF, while the fitted CF from Section 2 = 116.9ºF. In accordance with RG 1.99, R2, the sigma-Δ has been reduced by 0.5.

[7] The CF for this ISP plate material is given in BWRVIP-135, Revision 1, Section A-9.

[8] The original plant-specific chemistry values for this material are shown here but the best-estimate chemistry values from BWRVIP-135, Revision 1 for this material are provided in Table 4.2.3-4. It is intended that the best-estimate chemistry values supersede the plant-specific chemistry values.

Table 4.2.3-3
Unit 2 57 EFPY Adjusted Reference Temperature (ART) Values for Beltline Plates and Welds

Beltline I.D.	Heat No.	Lot No.	% Cu	% Ni	CF	Initial RT_{NDT}	57 EFPY 1/4 T Fluence	Δ RT_{NDT} ºF	Sigma-i	Sigma- Δ	Margin ºF	57 EFPY Shift ºF	57 EFPY 1/4 T ART ºF
PLATES – LOWER SHELL 1:													
14-1	B3312-1	N/A	0.13	0.58	90	10	5.5 E+17	28	0	14	28	55	65
14-2	B3416-1	N/A	0.14	0.65	101	40	5.5 E+17	31	0	15	31	62	102
14-3	C9621-2	N/A	0.15	0.60	110	22	5.5 E+17	34	0	17	34	67	89
PLATES – LOWER-INTERMEDIATE SHELL 2:													
17-1	C9569-2	N/A	0.11	0.51	73	10	7.6 E+17	27	0	13	27	53	63
17-2	C9526-1	N/A	0.11	0.56	74	10	7.6 E+17	27	0	13	27	54	64
17-3	C9526-2	N/A	0.11	0.56	74	10	7.6 E+17	27	0	13	27	54	64
WELDS – AXIAL (VERTICAL): [1]													
BA	432A2671	H019A27A	0.04	1.08	54	-12	3.7 E+17	13	0	7	13	27	15
BB	432A2671	H019A27A	0.04	1.08	54	-12	4.0 E+17	14	0	7	14	28	16
BD	432A2671	H019A27A	0.04	1.08	54	-12	6.1 E+17	18	0	9	18	35	23
BE	432A2671	H019A27A	0.04	1.08	54	-12	6.1 E+17	18	0	9	18	35	23
BF	432A2671	H019A27A	0.04	1.08	54	-12	5.3 E+17	16	0	8	16	33	21
BA	03R728	L910A27A	0.03	0.92	41	-50	3.7 E+17	10	0	5	10	20	-30
BC	03R728	L910A27A	0.03	0.92	41	-50	5.0 E+17	12	0	6	12	24	-26

Table 4.2.3-3
Unit 2 57 EFPY Adjusted Reference Temperature (ART) Values for Beltline Plates and Welds

Beltline I.D.	Heat No.	Lot No.	% Cu	% Ni	CF	Initial RT_{NDT}	57 EFPY 1/4 T Fluence	ΔRT_{NDT} ºF	Sigma-i	Sigma- Δ	Margin ºF	57 EFPY Shift ºF	57 EFPY 1/4 T ART ºF
BA	3P4000	3933 [2,3]	0.02	0.928	27	-50	3.7 E+17	7	0	3	7	13	-37
BB	3P4000	3933 [2,3]	0.02	0.928	27	-50	4.0 E+17	7	0	3	7	14	-36
BC	3P4000	3933 [2,3]	0.02	0.928	27	-50	5.0 E+17	8	0	4	8	16	-34
BD	3P4000	3933 [2,3]	0.02	0.928	27	-50	6.1 E+17	9	0	4	9	18	-32
BE	3P4000	3933 [2,3]	0.02	0.928	27	-50	6.1 E+17	9	0	4	9	18	-32
BF	3P4000	3933 [2,3]	0.02	0.928	27	-50	5.3 E+17	8	0	4	8	16	-34
BB	401Z9711	A022A27A	0.02	0.83	27	-50	4.0 E+17	7	0	3	7	14	-36
BC	662A746	H013A27A	0.03	0.88	41	-20	5.0 E+17	12	0	6	12	24	4
BC	402A0462	B023A27A	0.02	0.90	27	-50	5.0 E+17	8	0	4	8	16	-34
BC	07L669	K004A27A	0.03	1.02	41	-50	5.0 E+17	12	0	6	12	24	-26
BD	07L669	K004A27A	0.03	1.02	41	-50	6.1 E+17	13	0	7	13	27	-23
BE	07L669	K004A27A	0.03	1.02	41	-50	6.1 E+17	13	0	7	13	27	-23
BF	07L669	K004A27A	0.03	1.02	41	-50	5.3 E+17	12	0	6	12	25	-25
BD	09L853	A111A27A	0.03	0.86	41	-50	6.1 E+17	13	0	7	13	27	-23
BE	09L853	A111A27A	0.03	0.86	41	-50	6.1 E+17	13	0	7	13	27	-23

Table 4.2.3-3
Unit 2 57 EFPY Adjusted Reference Temperature (ART) Values for Beltline Plates and Welds

Beltline I.D.	Heat No.	Lot No.	% Cu	% Ni	CF	Initial RT_{NDT}	57 EFPY 1/4 T Fluence	Δ RT_{NDT} ºF	Sigma-i	Sigma- Δ	Margin ºF	57 EFPY Shift ºF	57 EFPY 1/4 T ART ºF
WELDS – GIRTH (CIRCUMFERENTIAL):													
AB	07L857	B101A27A	0.03	0.97	41	-6	5.5 E+17	13	0	6	13	25	19
AB	L83355	S411B27AD	0.03	1.08	41	-70	5.5 E+17	13	0	6	13	25	-45
AB	402C4371	C115A27A	0.02	0.92	27	-50	5.5 E+17	8	0	4	8	17	-33
AB	03M014	C118A27A	0.01	0.94	20	-34	5.5 E+17	6	0	3	6	12	-22
AB	411A3531	H004A27A	0.02	0.96	27	-50	5.5 E+17	8	0	4	8	17	-33
AB	09M057	C109A27A	0.03	0.89	41	-36	5.5 E+17	13	0	6	13	25	-11
AB	640892	J424B27AE	0.09	1.00	122	-60	5.5 E+17	37	0	19	37	75	15
AB	401P6741	S419B27AG	0.03	0.92	41	-60	5.5 E+17	13	0	6	13	25	-35
AB	412P3611	J417B27AF	0.03	0.93	41	-80	5.5 E+17	13	0	6	13	25	-55

NOTES:

[1] Welds BA, BB, and BC occur in the lower shell #1 and welds BD, BE, and BF occur in the lower-intermediate shell #2.

[2] The original plant-specific chemistry values for this material are shown here but the best-estimate chemistry values from BWRVIP-135, Revision 1 for this material are provided in Table 4.2.3-4. It is intended that the best-estimate chemistry values supersede the plant-specific chemistry values.

[3] Heat 3P4000 data is available for both tandem and single wire; there is no change in percent copper. The limiting %Ni is used (single = 0.89; tandem = 0.95). The plant-specific percent nickel used is 0.928; this value agrees with the NRC database RVID2.

Table 4.2.3-4
Unit 2 57 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}	57 EFPY 1/4 T Fluence n/cm^2	Δ RT_{NDT}	Sigma-i	Sigma-Δ	Margin ºF	57 EFPY Shift ºF	57 EFPY 1/4 T ART ºF
N16 WATER LEVEL INSTRUMENTATION (WLI) NOZZLE FORGINGS:													
N16-0°	SB-166 [1]	N/A	0.11	0.56	74	10	1.0 E+17	8	0	4	8	16	26
N16-100°	SB-166 [1]	N/A	0.11	0.56	74	10	1.4 E+17	10	0	5	10	21	31
N16-200°	SB-166 [1]	N/A	0.11	0.56	74	10	2.4 E+17	14	0	7	14	28	38
N16-280°	SB-166 [1]	N/A	0.11	0.56	74	10	1.4 E+17	10	0	5	10	21	31
N17 LOW PRESSURE COOLANT INJECTION (LPCI) NOZZLE FORGINGS:													
892L-1	Q2Q33W	N/A	0.18	0.83	141	-20	3.3 E+17	33	0	16	33	65	45
892L-2	Q2Q33W	N/A	0.18	0.81	141	-6	3.3 E+17	33	0	16	33	65	59
892L-3	Q2Q33W	N/A	0.18	0.82	141	-4	3.3 E+17	33	0	16	33	65	61
892L-4	Q2Q33W	N/A	0.18	0.82	141	-20	3.3 E+17	33	0	16	33	65	45
N17 LPCI NOZZLE-TO-SHELL WELDS													
KA	C3L46C	J020A27A	0.02	0.87	27	-20	3.3 E+17	6	0	3	6	12	-8
KA	422B7201	L030A27A	0.04	0.90	54	-40	3.3 E+17	12	0	6	12	25	-15

Table 4.2.3-4
Unit 2 57 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}	57 EFPY 1/4 T Fluence n/cm^2	ΔRT_{NDT}	Sigma-i	Sigma-Δ	Margin ºF	57 EFPY Shift ºF	57 EFPY 1/4 T ART ºF
KA	4P4784 (single wire)	3930	0.06	0.87	82	-50	3.3 E+17	19	0	9	19	38	-12
KA	4P4784 (tandem wire)	3930	0.06	0.87	82	-20	3.3 E+17	19	0	9	19	38	18
KA	07L669	K004A27A	0.03	1.02	41	-50	3.3 E+17	9	0	5	9	19	-31
KA	09L853	A111A27A	0.03	0.86	41	-50	3.3 E+17	9	0	5	9	19	-31
KA	432A2671	H019A27A	0.04	1.08	54	-12	3.3 E+17	12	0	6	12	25	13
BEST-ESTIMATE CHEMISTRIES PER BWRVIP-135 R1: [11]													
BA	3P4000	N/A	0.02	0.935	27	-50	3.7 E+17	7	0	3	7	13	-37
BB	3P4000	N/A	0.02	0.935	27	-50	4.0 E+17	7	0	3	7	14	-36
BC	3P4000	N/A	0.02	0.935	27	-50	5.0 E+17	8	0	4	8	16	-34
BD	3P4000	N/A	0.02	0.935	27	-50	6.1 E+17	9	0	4	9	18	-32
BE	3P4000	N/A	0.02	0.935	27	-50	6.1 E+17	9	0	4	9	18	-32
BF	3P4000	N/A	0.02	0.935	27	-50	5.3 E+17	8	0	4	8	16	-34
Weld [7]	CTY538	A027A27A	0.03	0.83	41	-50	7.6 E+17	15	0	7	15	30	-20
Weld	5P6756 [3,6]	N/A	0.08	0.936	108 [5]	-6	5.5 E+17	33	0	17	33	66	60

Table 4.2.3-4
Unit 2 57 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}	57 EFPY 1/4 T Fluence n/cm^2	ΔRT_{NDT}	Sigma-i	Sigma-Δ	Margin ºF	57 EFPY Shift ºF	57 EFPY 1/4 T ART ºF
Weld	5P6756 [3,6]	N/A	0.08	0.936	154 [5]	-6 [7]	5.5 E+17	47	0	14	28	75	69
ISP BWRVIP-135 R1 UPDATED ART TABLES:													
Plate	B0673-1 [2]	N/A	0.15	0.65	111	40	7.6 E+17	40	0	17	34	74	114
Weld	5P6756 [3]	N/A	0.06 0.08	0.93 0.936	[5] 154 154	-6 -6	5.5 E+17 5.5 E+17	47 47	0 0	14 14	28 28	75 75	69 69

NOTES:

[1] The N16 nozzle forging and welds are fabricated from nickel Alloy 600, which is not a ferritic material and therefore does not require evaluation for loss of fracture toughness. However, the plate at this location is evaluated for ART using the fluence at the nozzle and the limiting material properties (chemistry and initial RT_{NDT}) of the surrounding Lower-Intermediate Shell No. 2 plate. The N16 welds do not require evaluation.

[2] The ISP plate material is NOT the same heat as the target vessel plate material. The results provided are for information only and do not affect the Unit 2 P-T limits.

[3] The ISP weld material is NOT the same heat as the target vessel weld material. The results provided are for information only and do not affect the Unit 2 P-T limits.

[4] CMTR records do not indicate that this is a surveillance weld. However, the CMTRs demonstrate that this heat is a weld in the vessel; therefore, it is evaluated using the best estimate chemistry from BWRVIP-135 Revision 1.

[5] The Adjusted CF is calculated as: (108/82) * 116.9 = 154ºF. Note that the chemistry values provided represent the BWRVIP-135 Revision 1 Appendix B values (first value) and the BWRVIP-135 R1 Appendix D best estimate chemistry (second value). These are provided for clarity. The Appendix B chemistry results in a CF = 82ºF; the Appendix D chemistry results in a CF = 108ºF; and the fitted CF from Section 2 = 116.9ºF. In accordance with RG 1.99, the sigma-Δ has been reduced by 0.5.

[6] This heat is presented with the CF prior to adjustment (108) and after adjustment (154) in order to provide both sets of data.

[7] This heat is not in the Unit 2 vessel so the maximum RT_{NDT} value for Unit 2 weld materials, -6 degrees F, was used.

[8] The ART values computed for the best-estimate chemistries are intended to supersede the ART values computed using the plant-specific chemistries. BWRVIP-135, Revision 2 has been issued, but contains no change to data for LGS. Therefore, BWRVIP-135, Revision 1 remains applicable for this evaluation.

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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, including heatup and cooldown operations. These limits specify the maximum allowable pressure as a function of reactor coolant temperature. As the reactor pressure vessel is exposed to increased neutron irradiation, its fracture toughness is reduced. The P-T limits must account for the anticipated reactor vessel fluence.

The current Pressure-Temperature limit curves 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. However, the actual plant capacity factors for recent operational cycles have increased to over 95 percent and, as a result, the 40-year average capacity factor will approach 95 percent. Unit 1 is projected to exceed 32 EFPY during operating cycle 19, which begins in the year 2020, and Unit 2 is projected to exceed 32 EFPY during operating cycle 18, which begins in year 2023. 10 CFR 50, Appendix G, requires new P-T limits to be developed for higher fluence values and approved by the NRC prior to exceeding 32 EFPY. However, since the 32 EFPY projections were originally based upon a 40-year assumption regarding capacity factor, 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, the P-T limits for the period of extended operation need not be submitted as part of the LRA since the P-T limits are required to be updated through the 10 CFR 50.90 licensing process when necessary for P-T limits that are located in the Technical Specifications (TS). 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, which constitute 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 P-T limit curves for the current period of operation.

The LGS P-T limits are currently located in the Technical Specifications, but submittal of a PTLR may be submitted for NRC approval for the next P-T limit update, which must occur prior to 32 EFPY. Therefore, 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 for the period of extended operation. The Reactor Surveillance (B.2.21) program will assure that updated P-T limit curves based upon updated ART values will be submitted to the NRC for approval prior to exceeding 32 EFPY. The P-T limit curves will be maintained during the period of extended operation either using the current 10 CFR 50.90 process for P-T limits located in the Technical Specifications or, if a PTLR has been approved by that time, using the Administrative Controls Process to amend the P-T limits through the PTLR process.

4.2.5 AXIAL WELD INSPECTION

TLAA Description:

The BWRVIP recommendations for inspection of reactor pressure vessel shell welds in BWRVIP-05 (Reference 4.7.14) 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 4.7.15) 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 as described in 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 assessment is based upon 32 EFPY fluence values associated with 40 years of operation, it has been identified as a TLAA requiring evaluation for 57 EFPY through the period of extended operation.

TLAA Evaluation:

The NRC assessment provided in the Final Safety Evaluation Report (FSER) to BWRVIP-05 (Reference 4.7.15) computed an axial weld failure probability value for the CB&I vessel at 64 EFPY which resulted in a Probability of Failure Event of 3.82 E-01. In order to evaluate the LGS Unit 1 and 2 axial weld failure probability assessments for 60 years, 57 EFPY fluence values were derived for the limiting axial welds from the RAMA fluence projections described in Section 4.2.1. Using these fluence values, the Mean RT_{NDT} values were computed for each unit.

Table 4.2.5-1 provides a comparison between the 64 EFPY NRC values and the 57 EFPY LGS Unit 1 and 2 values. Although a conditional failure probability has not been calculated for the LGS units, the fact that the Unit 1 and Unit 2 Mean RT_{NDT} values of -4 degrees F and 9 degrees F are significantly less than the NRC value of 117.1 degrees F leads to the conclusion that the Unit 1 and 2 conditional failure probability is bounded by the NRC analysis, consistent with the requirements defined in GL 98-05. Therefore, the projected mean RT_{NDT} values remain bounded by those in the NRC analysis.

TLAA Disposition: 10 CFR 54.21(c)(1)(ii) – The analysis has been projected through the period of extended operation.

Table 4.2.5-1
Comparison of NRC 64 EFPY Axial Weld Failure Probability Assessment to LGS 57 EFPY Axial Weld Failure Probability Assessments

Parameter	NRC Staff 64 EFPY Axial Weld Assessment [1]	Unit 1 57 EFPY Axial Weld Assessment	Unit 2 57 EFPY Axial Weld Assessment
	(CB&I RPV)	(CB&I RPV)	(CB&I RPV)
Copper Content (%)	0.10	0.03	0.04
Nickel Content (%)	1.08	0.88	1.08
Chemistry Factor (CF)	135	41	54
Fluence at 0T (n/cm^2)	1.38 E+19	9.08 E+17	8.99 E+17
Unirradiated Reference Temperature $RT_{NDT(U)}$ (ºF)	-30	-20	-12
Shift in Reference Temperature ΔRT_{NDT} (ºF)(without margin) [2]	147.1	16	21
Mean RT_{NDT} (ºF)	117.1	-4	9
Probability of Failure Event	3.82E-01	Bounded by NRC Probability [3]	Bounded by NRC Probability [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 4.7.15).

[2] $\Delta RT_{NDT} = CF * f^{(0.28 - 0.10 \log f)}$

[3] Although a conditional failure probability has not been calculated for LGS, the fact that the LGS Mean RT_{NDT} values are significantly less than the NRC values leads to the conclusion that the LGS conditional failure probability is bounded by the NRC analysis, consistent with the requirements defined in GL 98-05.

4.2.6 CIRCUMFERENTIAL WELD INSPECTION

TLAA Description:

LGS has previously applied for and been granted RPV circumferential weld inspection relief. LGS ISI Program Relief Request RR-1 dated January 30, 1998 (Reference 4.7.11) provided the justification for the relief request and NRC SER dated September 13, 1999 (Reference 4.7.12) provided acceptance of the LGS plan for inspection of the beltline axial and circumferential welds. This document defines alternate provisions for inspection of circumferential weld AB (circumferential weld between Lower Shell No. 1 and Lower-Intermediate Shell No. 2 of the beltline). The evaluation compared the 32 EFPY properties of the LGS Unit 1 and Unit 2 limiting circumferential weld with the 32 EFPY properties of a CB&I reactor vessel evaluated by the NRC for conditional failure probability of circumferential welds that resulted in a conditional failure probability of 2.00E-07, which was deemed acceptable. Since the current circumferential weld failure probability assessment is based upon 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.

TLAA Evaluation:

The NRC assessment provided in the "Final Safety Evaluation of the BWR Vessel and Internals Project BWRVIP-05 Report," (Reference 4.7.15) computed a circumferential weld failure probability value for the CB&I vessel at 64 EFPY which resulted in a Probability of Failure Event of 1.78 E-01 which was deemed acceptable. In order to evaluate the LGS Unit 1 and 2 circumferential weld failure probability assessments for 60 years, 57 EFPY fluence values were derived for the limiting circumferential weld from the RAMA fluence projections described in Section 4.2.1. Using these fluence values, the LGS Mean RT_{NDT} values were computed for each unit.

Table 4.2.6-1 compares the 64 EFPY values used by the NRC to assess circumferential weld probability to the 57 EFPY values for LGS Unit 1 and Unit 2. Although a conditional failure probability has not been calculated for the LGS units, the fact that the Unit 1 and Unit 2 Mean RT_{NDT} values of 10 degrees F and 9 degrees F are significantly less than the NRC value of 70.6 degrees F leads to the conclusion that the Unit 1 and 2 conditional failure probability is bounded by the NRC analysis, consistent with the requirements defined in GL 98-05.

This TLAA will be managed in accordance with 10 CFR 54.21(c)(1)(iii). Reapplication for relief from circumferential weld examination will be made under 10 CFR 50.55a(a)(3) for the period of extended operation. The plant-specific information described above demonstrates that at the end of the renewal period, the circumferential beltline weld materials meet the limiting conditional failure probability for circumferential welds specified in the FSER of BWRVIP-05. Operator training and procedures will continue to be utilized during the license renewal term to limit the frequency for cold over-pressure events.

TLAA Disposition: 10 CFR 54.21(c)(1)(iii) – The effects of aging on the intended function(s) will be adequately managed for the period of extended operation by reapplication for relief from circumferential weld examination under 10 CFR 50.55a(a)(3).

Table 4.2.6-1
Comparison of NRC 64 EFPY Circumferential Weld Failure Probability Assessment to LGS 57 EFPY Circumferential Weld Failure Probability Assessments

Parameter	NRC Staff 64 EFPY Circumferential Weld Assessment [1]	Unit 1 57 EFPY Circumferential Weld Assessment	Unit 2 57 EFPY Circumferential Weld Assessment
	(CB&I RPV)	(CB&I Vessel)	(CB&I Vessel)
Copper Content (%)	0.1	0.03	0.03
Nickel Content (%)	0.99	0.97	0.97
Chemistry Factor (CF)	134.9	41	41
Fluence at 0T (n/cm^2)	1.02 E+19	8.35 E+19	8.02 E+19
Unirradiated Reference Temperature $RT_{NDT(U)}$ (ºF)	-65	-6	-6
Shift in Reference Temperature ΔRT_{NDT} (ºF)(without margin) [2]	135.6	16	15
Mean RT_{NDT} (ºF)	70.6	10	9
Probability of Failure Event	1.78E-05	Bounded by NRC Probability [3]	Bounded by NRC Probability [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.

[2] $\Delta RT_{NDT} = CF * f^{(0.28 - 0.10 \log f)}$

[3] Although a conditional failure probability has not been calculated for LGS, the fact that the LGS Mean RT_{NDT} values are significantly less than the NRC values leads to the conclusion that the Unit 1 and Unit 2 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

TLAA Description:

A generic fracture mechanics evaluation was performed in 1979 to evaluate the effects of a postulated Loss of Coolant Accident (LOCA) on the structural integrity of a boiling water reactor pressure vessel (Reference 4.7.16). The LOCA event considered was a rupture of a main steam line, which 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 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.

The temperature distribution and the resulting thermal stress in the vessel wall were determined using an axisymmetric 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 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.

This generic analysis envelopes LGS and was based upon 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.

TLAA Evaluation:

The original reflood shock analysis assumed that prior to the LOCA, the vessel wall was in steady state equilibrium with the reactor coolant at 550 degrees F. The analysis showed that the maximum applied stress intensity factor reaches a peak value of approximately 100 ksi-in$^{1/2}$ 300 seconds after the LOCA occurred and slowly diminishes after that point in the event. It also showed that at 300 seconds into the event, the temperature at the 1/4 T depth from the inside surface of the vessel wall was reduced to approximately 400 degrees F. The original analysis showed that the material fracture toughness at that point in the event exceeded the applied stress intensity factor by a significant margin, and therefore an existing flaw in the vessel would not propagate due to brittle fracture during a LOCA.

An updated 60-year fracture mechanics evaluation was performed for the reflood thermal shock event using plant-specific reactor pressure vessel data for Unit 1 and Unit 2. The limiting adjusted reference temperature (ART) values for Unit 1 and Unit 2 beltline materials, based upon 57 EFPY fluence projections, were used in these fracture mechanics analyses. The adjusted reference temperature is the RT_{NDT} value adjusted to account for increased fluence during the life of the component.

In the updated analysis, adjustments were made to account for the actual LGS reactor vessel wall thickness. Also the temperature assumed for the 1/4 T depth at the time of maximum applied stress intensity factor was adjusted from 400 degrees F to 370 degrees F to assure the temperature at which the maximum applied stress intensity occurs is bounded.

The analysis next determined if the material had sufficient fracture toughness to resist the applied stress intensity factor by determining the temperature at which K_{IC} of the beltline material with the limiting ART value reaches the upper shelf 200 ksi-in$^{1/2}$, the upper limit of the K_{IC} curve, given in Figure G-4200-1 of ASME Section XI, Appendix G (Reference 4.7.17). K_{IC} is defined in ASME Section XI, Appendix G as the fracture toughness associated with static crack initiation for a given material:

K_{IC} = 33.2 + 20.734 exp[0.02 (T – RT_{NDT})]   (note: RT_{NDT} = ART)

By setting K_{IC} = 200 ksi-in$^{1/2}$, and using the limiting 57 EFPY Unit 1 ART value of 74 degrees F for beltline shell 17-2, Heat C7677-1 (obtained from Table 4.2.3-1), T was determined to be 178 degrees F.

For Unit 2, using the limiting 57 EFPY ART value of 102 degrees F for beltline shell 14-2, Heat B3416-1 (obtained from Table 4.2.3-2), T was determined to be 206 degrees F.

This means the material will retain a minimum toughness of 200 ksi-in$^{1/2}$ as long as the temperature remains at 178 degrees F or above for Unit 1 and at 206 degrees F or above for Unit 2.

The results obtained provide an upper bound on applied stress intensity factor and a lower bound on the material toughness, based upon 60-year fluence values. Since the 1/4 T location will be at least 370 degrees F at the time of the maximum applied stress intensity, the maximum applied stress intensity factor (100 ksi-in$^{1/2}$) will be less than the fracture toughness of the material (200 ksi-in$^{1/2}$) by a significant margin. Therefore, during the period of extended operation for both units, there is sufficient toughness margin to prevent fracture due to reflood thermal shock. An existing flaw in the reactor vessel would not propagate due to brittle fracture during a LOCA.

TLAA Disposition: 10 CFR 54.21(c)(1)(ii) – The analysis has been projected for the period of extended operation.

4.3 METAL FATIGUE

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 LGS. 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 LGS 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)

4.3.1 ASME SECTION III, CLASS 1 FATIGUE ANALYSES

TLAA Description:

The LGS 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 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 evaluated an explicit number and type of transients that were postulated in the design specifications to envelope the number of occurrences possible during the 40-year design life of the plant. The 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 cycles and that the fatigue usage factor for step changes in fluid temperature I_t does not exceed a limit of 1.0.

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 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 LGS include the stress reports for the Reactor Pressure Vessel (RPV), reactor coolant pressure boundary (RCPB) piping and components, including Class 1 valves. The current Class 1 fatigue analyses are based upon the same 40-year design transients as the original analyses, which are those listed in

UFSAR Table 3.9-2, "Plant Events," for the RPV and UFSAR Table 5.2-9 ”RCPB Operating Thermal Cycles" for the RCPB components (Reference 4.7.18). Each Class 1 fatigue analysis demonstrates that the component has a CUF value that does not exceed the design Code limit of 1.0.

Each of the Class 1 fatigue analyses may be evaluated for 60 years by determining whether or not the numbers of cycles assumed in the analysis will remain bounding of the actual numbers of cycles predicted to be experienced by the component through the end of the period of extended operation. The 60-year transient projections described below demonstrate that the numbers of cycles currently analyzed for LGS Class 1 components, which are considered to be design transient limits, will not be exceeded during the period of extended operation. Therefore, the current Class 1 fatigue analyses will be demonstrated to remain valid for the period of extended operation.

Using transient cycle monitoring data from the Fatigue Monitoring (B.3.1.1) program, 60-year transient projections were developed, as shown in Table 4.3.1-1 for Unit 1 and Table 4.3.1-2 for Unit 2. The third column lists the cumulative number of cycles to-date, including cycles that occurred during pre-operational startup testing and during all plant operations through early January 2011. The fourth column shows the numbers of cycles projected to occur over 60 years, based upon a linear extrapolation using the average rate of occurrence during the baseline period that started at the beginning of operating cycle 1 and ended in January 2011 for each unit. 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 60-year projected cycles, and the added margin. The seventh column is the current design cycle limit, which is the number of cycles analyzed in the Class 1 fatigue analyses.

The projections show that the current design cycle limits will not be exceeded during 60 years of plant operation for Unit 1 and Unit 2. Therefore, none of the transient types are expected to be exceeded during the period of extended operation. Therefore, the Class 1 fatigue analyses will remain valid for the period of extended operation. This is based upon the assumption that the rates of cycle occurrence in the future will not exceed the average rates of occurrence of past cycles. Each of these transient projections were trended graphically to determine if recent rates of occurrence could be higher than the overall average rate of occurrence. The trending shows that recent transient occurrence rates are bounded by the average occurrence rates. In order to assure that this conclusion and basis remains valid, the Fatigue Monitoring (B.3.1.1) program will be used to monitor and track transient cycle occurrences through the end of the period of extended operation to ensure that these limits are not exceeded.

The program includes requirements that trigger corrective action if a transient approaches a cycle limit. If the rates of future occurrence increase for any reason, corrective action may include reanalysis of affected Class 1 components to address increased numbers of cycles, repair, or replacement of the component. Since the Fatigue Monitoring program will be needed to validate the transient projection assumptions, it will be credited for managing these Class 1 fatigue TLAAs for the period of extended operation.

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.

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Table 4.3.1-1 – 60-Year Transient Cycle Projections for Unit 1

Transient Number	Transient Description	Cumulative Cycles to-date (Jan. 2011)	60-Year Projected Cycles	Roundup or Added Margin	Adjusted 60-Year Projected Cycles	Design Cycle Limits
1.	Bolt up	17	39	0	39	123
2.	Design Hydrostatic test	26	55	0	55	130
3.	Startup (100F/hr max)	52	112	0	112	120
4.	Daily Reduction to 75%	108	255	0	255	10,000
5.	Weekly Reduction to 50%	37	88	0	88	2,000
6.	Control Rod Pattern Change	46	109	0	109	400
7a.	Partial Loss of Feedwater Heaters	22	50	0	50	70
7b.	Full Loss of Feedwater Heaters	0	0	5	5	10
8a.	Operating Basis Earthquake (OBE): Event at Rated Operating Conditions for NSSS Piping	0	0	10	10	50 [1]
8b.	Operating Basis Earthquake (OBE): Event at Rated Operating Conditions for Other NSSS Components	0	0	10	10	10 [2]
9a.	Scram - Turbine-Generator Trip, Feedwater Stays ON, Isolation Valves Stay OPEN	14	33	0	33	40
9b.	Scram - All Other Scrams	47	111	0	111	140
10.	Shutdown - Includes Reduction to 0% Power, Hot Standby, Shutdown (Before Vessel Flooding), Vessel Flooding, and Shutdown (After Vessel Flooding)	50	109	0	109	120

Table 4.3.1-1 – 60-Year Transient Cycle Projections for Unit 1

Transient Number	Transient Description	Cumulative Cycles to-date (Jan. 2011)	60-Year Projected Cycles	Roundup or Added Margin	Adjusted 60-Year Projected Cycles	Design Cycle Limits
11.	Unbolt	16	38	0	38	123
12.	Pre-operational Blowdown (1000 psig to 170 psig over 10 minutes)	0	0	5	5	10
13.	Loss of A/C Power	0	0	3	3	5 [3]
14a.	Emergency Scram - Reactor Overpressure with Delayed Scram, Feedwater Stays ON, Isolation Valves Stay Open	0	0	1	1	1
14b.	Emergency Scram - Loss of Feedwater Pumps, Isolation Valves Close	2	5	0	5	5 [3] 10 [4]
14c.	Emergency Scram - Automatic Blowdown (1000 psig to 170 psig over 3.3 minutes)	0	0	1	1	1
14d.	Emergency Scram - Single Relief Valve or Safety Valve Blowdown	1	3	0	3	8
15.	Emergency Condition - Improper Start of Cold Recirculation Loop	0	0	1	1	1
16.	Emergency Condition - Sudden Start of Recirculation Pump in Cold Recirculation Loop	0	0	1	1	1
17.	Emergency Condition - Improper Startup with Reactor Drain Shut Off	0	0	1	1	1

Table 4.3.1-1 – 60-Year Transient Cycle Projections for Unit 1

Transient Number	Transient Description	Cumulative Cycles to-date (Jan. 2011)	60-Year Projected Cycles	Roundup or Added Margin	Adjusted 60-Year Projected Cycles	Design Cycle Limits
	ECCS / RCIC and SLC Injections					
N/A	Reactor Core Isolation Cooling (RCIC)	6	14	0	14	15
N/A	High Pressure Coolant Injection (HPCI)	6	9	0	9	15
N/A	Core Spray (CS)	0	0	2	2	N/A
N/A	Low Pressure Coolant Injection (LPCI) I	0	0	2	2	N/A
N/A	Standby Liquid Control (SLC)	0	0	2	2	10

[1] The design cycle limit for transient 8a, OBE for NSSS piping components, is 5 events with 10 cycles per event, for a total of 50 cycles.
[2] The design cycle limit for transient 8b, OBE for Other NSSS components, is 1 event with 10 cycles per event.
[3] For the RPV, 5 Loss of A/ C Power transients (no. 13) and 5 Loss of Feedpump transients (no. 14b) were analyzed.
[4] For RCPB piping, 10 cycles of the Loss of Feedpump transient (no. 14b) were analyzed and 0 Loss of A/C Power transients (no. 13) were analyzed.

Table 4.3.1-2 – 60-Year Transient Cycle Projections for LGS Unit 2

Transient Number	Transient Description	Cumulative Cycles to-date (Jan. 2011)	60-Year Projected Cycles	Roundup or Added Margin	Adjusted 60-Year Projected Cycles	Design Cycle Limits
1.	Bolt up	13	32	0	32	123
2.	Design Hydrostatic test	15	39	0	39	130
3.	Startup (100F/hr max)	35	90	0	90	120
4.	Daily Reduction to 75%	123	349	0	349	10,000
5.	Weekly Reduction to 50%	67	190	0	190	2,000
6.	Control Rod Pattern Change	46	131	0	131	400
7a.	Partial Loss of Feedwater Heaters	18	48	0	48	70
7b.	Full Loss of Feedwater Heaters	0	0	5	5	10
8a.	Operating Basis Earthquake (OBE): Event at Rated Operating Conditions for NSSS Piping	0	0	10	10	50 [1]
8b.	Operating Basis Earthquake (OBE): Event at Rated Operating Conditions for Other NSSS Components	0	0	10	10	10 [2]
9a.	Scram - Turbine-Generator Trip, Feedwater Stays ON, Isolation Valves Stay OPEN	14	36	0	36	40
9b.	Scram - All Other Scrams	35	100	0	100	140
10.	Shutdown - Includes Reduction to 0% Power, Hot Standby, Shutdown (Before Vessel Flooding), Vessel Flooding, and Shutdown (After Vessel Flooding)	33	88	0	88	120

Table 4.3.1-2 – 60-Year Transient Cycle Projections for LGS Unit 2

Transient Number	Transient Description	Cumulative Cycles to-date (Jan. 2011)	60-Year Projected Cycles	Roundup or Added Margin	Adjusted 60-Year Projected Cycles	Design Cycle Limits
11.	Unbolt	13	34	0	34	123
12.	Pre-operational Blowdown (1000 psig to 170 psig over 10 minutes)	0	0	5	5	10
13.	Loss of A/C Power	0	0	3	3	5 [3]
14a.	Emergency Scram - Reactor Overpressure with Delayed Scram, Feedwater Stays ON, Isolation Valves Stay Open	0	0	1	1	1
14b.	Emergency Scram - Loss of Feedwater Pumps, Isolation Valves Close	2	5	0	5	5 [3] 10 [4]
14c.	Emergency Scram - Automatic Blowdown (1000 psig to 170 psig over 3.3 minutes)	0	0	1	1	1
14d.	Emergency Scram - Single Relief Valve or Safety Valve Blowdown	1	3	0	3	8
15.	Emergency Condition - Improper Start of Cold Recirculation Loop	0	0	1	1	1
16.	Emergency Condition - Sudden Start of Recirculation Pump in Cold Recirculation Loop	0	0	1	1	1
17.	Emergency Condition - Improper Startup with Reactor Drain Shut Off	0	0	1	1	1

Table 4.3.1-2 – 60-Year Transient Cycle Projections for LGS Unit 2

Transient Number	Transient Description	Cumulative Cycles to-date (Jan. 2011)	60-Year Projected Cycles	Roundup or Added Margin	Adjusted 60-Year Projected Cycles	Design Cycle Limits
	ECCS / RCIC and SLC Injections					
N/A	Reactor Core Isolation Cooling (RCIC)	4	6	0	6	15
N/A	High Pressure Coolant Injection (HPCI)	3	5	0	5	15
N/A	Core Spray (CS)	0	0	2	2	N/A
N/A	Low Pressure Coolant Injection (LPCI) I	0	0	2	2	N/A
N/A	Standby Liquid Control (SLC)	0	0	2	2	10

[1] The design cycle limit for transient 8a, OBE for NSSS piping components, is 5 events with 10 cycles per event, for a total of 50 cycles.
[2] The design cycle limit for transient 8b, OBE for Other NSSS components, is 1 event with 10 cycles per event.
[3] For the RPV, 5 Loss of A/ C Power transients (no. 13) and 5 Loss of Feedpump transients (no. 14b) were analyzed.
[4] For RCPB piping, 10 cycles of the Loss of Feedpump transient (no. 14b) were analyzed and 0 Loss of A/C Power transients (no. 13) were analyzed.

4.3.2 ASME SECTION III, CLASS 2 AND 3 AND ANSI B31.1 ALLOWABLE STRESS CALCULATIONS

TLAA Description:

Piping designed in accordance with ASME Section III, Class 2 or 3 design rules 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 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 reduces 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:

For the ASME Section III, Class 2 and 3 and ANSI B31.1 systems that are connected to ASME Section III, Class 1 piping, and are affected by the same operational transients, the 60-year cycle projections demonstrate that the total number of thermal and pressure cycles of all of the transient types added together will not exceed 7,000 cycles during the period of extended operation. Therefore, the stress range reduction factor will not change and the TLAAs will remain valid for the period of extended operation. This includes the applicable portions of the following systems: Residual Heat Removal, Core Spray, Reactor Core Isolation Cooling, High Pressure Coolant Injection, Reactor Water Cleanup, Control Rod Drive, Main Steam, Main Turbine, Extraction Steam, Feedwater, Condenser and Air Removal, and Radwaste.

For the remaining systems that are affected by different thermal and pressure cycles, an operational review was performed that also concluded that the total number of cycles, projected for 60 years, will not exceed 7,000 cycles for these systems. This includes the Fire Protection, Emergency Diesel Generator, and Auxiliary Steam systems. Systems with operating temperatures below specified thresholds were determined to have low numbers of equivalent full temperature cycles since the fluid temperature changes are small. Therefore, since the stress range reduction factors originally selected for the components in all of 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

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 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 selected in NUREG/CR-6260 (Reference 4.7.19) applicable to the plant. Applicants should consider adding additional component locations if they are considered to be more limiting than those considered in NUREG/CR-6260.

Environmental fatigue calculations were performed for each component location 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 has a reported CUF value in the stress report and for each Class 1 RCPB piping system in each unit. These calculations were performed for the limiting location for each material within the component or system that contacts reactor coolant.

Table 4.3.3-1 shows the results from the environmental fatigue calculations for the RPV components. Table 4.3.3-2 shows the results for the Class 1 RCPB systems. This table uses 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.

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 LGS components for environmental effects:

<u>Carbon and Low Alloy Steels</u>

- Those provided in Appendix A of NUREG/CR-6909 (Reference 4.7. 20), using either the applicable ASME Section III fatigue design curve or 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).

<u>Nickel Alloys</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).

For stainless steel and nickel alloy materials, a new CUF value was computed using the NUREG/CR-6909 stainless steel fatigue curve, based upon the alternating stress values from the current ASME Code fatigue analysis. The F_{en} multipliers were computed based upon the stainless steel formula or nickel alloy formula provided in NUREG/CR-6909, as appropriate. 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 each unit, the percentage of time the plant will have operated within each chemistry regime by the end of the period of extended operation was determined based upon a review of plant chemistry records, as described further below.

For carbon and low-alloy steel components, the CUF value from the current Class 1 fatigue analysis, derived from the ASME Code fatigue curve, was initially used in conjunction with a bounding F_{en} multiplier computed using the applicable formula from NUREG/CR-6909 for carbon steel or low-alloy steel, as applicable. The F_{en} multipliers were computed using bounding assumptions for temperature, strain rate, and sulfur content, but with a dissolved oxygen assumption appropriate for the component location, as described further below. If the resulting environmentally-adjusted cumulative usage factor CUF_{en} was less than the design Code limit of 1.0, those results are reported. If the CUF_{en} value was greater than 1.0, the analysis was further refined, first by recomputing the CUF value using the fatigue curve from NUREG/CR-6909 for the material.

For all materials, additional refinements were performed as necessary to further reduce conservatism 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 the CUF_{en} value remained above 1.0 after all of the previously described methods were applied, a reduced number of transient cycles was used, provided the reduced value was at or above the 60-year projected values shown previously in Table 4.3.1-1 or 4.3.1-2 as applicable.

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 4.7.21). 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 a period where Hydrogen Water Chemistry (HWC) was used alone, and then 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, HWC, and HWC + NMCA) for each region of the reactor vessel and for each affected Class 1 piping system.

For each unit, the percentage of time the plant will have operated within each regime by the end of the period of extended operation were determined based upon a review of plant chemistry records. Unit 1 will have operated under NMC conditions for 27.3 percent of the time, HWC conditions for 2.3 percent of the time, and HMC + NMCA conditions for 70.4 percent of the time. Unit 2 will have operated under NMC conditions for 21.6 percent of the time, HWC conditions for 5.1 percent of the time, and HWC + NMCA conditions for 73.3 percent of the time. Since carbon and low alloy steels have a lower F_{en} value with lower dissolved oxygen values, the HWC and NMCA system availability was assumed to be only 90 percent in determining these percentages, as compared with actual system availability to-date of over 95 percent, to assure conservative results were obtained. 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 example, for a Unit 1 low-alloy steel nozzle, the F_{en} multiplier was determined as shown below:

Overall F_{en} = F_{en} (NWC) x 0.273 + F_{en} (HWC) x 0.023 + F_{en} (HWC + NMCA) x 0.704
Overall F_{en} = (10.95 x 0.273) + (5.21 x 0.023) + (6.02 x 0.704)
Overall F_{en} = 7.35

The Unit 2 F_{en} multiplier for the same location was determined as shown below:

Overall F_{en} = F_{en} (NWC) x 0.216 + F_{en} (HWC) x 0.051 + F_{en} (HWC + NMCA) x 0.733
Overall F_{en} = (10.95 x 0.216) + (5.21 x 0.051) + (6.02 x 0.733)
Overall F_{en} = 7.04

The F_{en} factors were applied to the 60-year CUF values and the resulting 60-year CUF_{en} values were demonstrated not to exceed the design Code limit of 1.0, as shown in Tables 4.3.3-1 and 4.3.3-2. The NUREG/CR-6260 locations are shown in the top part of the tables and the other locations evaluated are shown in the lower part of the tables. Since each RPV location that originally had a CUF value was evaluated and every Class 1 system was evaluated, any limiting locations not bounded by the NUREG/CR-6260 components have been evaluated.

These environmental fatigue analyses will be managed by the Fatigue Monitoring (B.3.1.1) program in the same manner as all other 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. Table 4.3.3-2 includes notes that describe where reduced numbers of cycles were used to qualify several piping locations. Prior to the period of extended operation, the Fatigue Monitoring (B.3.1.1) program will be enhanced to revise the transient cycle limits 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.

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. Environmental fatigue analyses will be reviewed and updated if necessary to assure the liming locations within each Class 1 system and within the RPV 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 LGS Fatigue Monitoring (B.3.1.1) program.

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Table 4.3.3-1
Unit 1 and Unit 2 Reactor Pressure Vessel (RPV) Environmental Fatigue Analysis Results

RPV Component and Data			Unit 1 CUF_{en} Results				Unit 2 CUF_{en} Results				
RPV Component	**Node**	**Material**	**ASME CUF**	**6909 CUF**	**6909 F_{en}**	**CUF_{en}**	**Node**	**ASME CUF**	**6909 CUF**	**6909 F_{en}**	**CUF_{en}**
NUREG/CR-6260 Components Ranked Highest CUF_{en} to Lowest											
LPCI Nozzle (Forging)	19	LAS	0.186	0.186	4.61	0.858	19	0.186	0.186	4.61	0.858
LPCI Nozzle (Safe End / Thermal Sleeve)	4	A600	0.504	0.420	1.94	0.815	4	0.504	0.420	1.94	0.815
Recirculation Outlet Nozzle (Forging)	4	LAS	0.475	0.140	5.31	0.746 [1]	4	0.475	0.140	5.31	0.746 [1]
Recirculation Outlet Nozzle (Safe End)	5	SS	0.012	0.048	6.21	0.297 [1]	5	0.012	0.048	6.21	0.297 [1]
RPV Shell at Stabilizer Bracket	5	LAS	0.228	0.099	6.97	0.687	5	0.228	0.099	6.97	0.687
Feedwater Nozzle (Safe End Inlay)	N/A	SS	0.473	0.276	2.34	0.645	N/A	0.473	0.276	2.34	0.645
Feedwater Nozzle (Forging)	4	LAS	0.82	0.030	2.17	0.064 [2]	4	0.82	0.030	2.17	0.064 [2]
Core Spray Nozzle (Safe End)	3	A600	0.073	0.085	3.59	0.304	3	0.073	0.085	3.59	0.304
Core Spray Nozzle (Forging)	22	LAS	0.097	0.040	6.97	0.277	22	0.097	0.040	6.97	0.277

Table 4.3.3-1
Unit 1 and Unit 2 Reactor Pressure Vessel (RPV) Environmental Fatigue Analysis Results

RPV Component and Data			Unit 1 CUF_{en} Results				Unit 2 CUF_{en} Results				
RPV Component	**Node**	**Material**	**ASME CUF**	**6909 CUF**	**6909 F_{en}**	**CUF_{en}**	**Node**	**ASME CUF**	**6909 CUF**	**6909 F_{en}**	**CUF_{en}**
Other Locations Ranked Highest CUF_{en} to Lowest											
Shroud Support	6	LAS	N/A [3]	0.278	3.42	0.949	6	N/A [3]	0.278	3.22	0.895
Incore Monitor Penetration	163	SS	0.108	0.140	5.94	0.83	163	0.108	0.140	5.94	0.83
Main Steam Outlet Nozzle (Forging)	4	LAS	0.85	0.330	2.77	0.914	4	0.85	0.330	2.74	0.903
Main Steam Outlet Nozzle (Safe End)	1	CS	0.085	N/A	2.77	0.235	1	0.085	N/A	2.74	0.233
CRD Housing Penetration (Stub Tube / Shell Weld)	12	A600	0.153	0.2690	3.61	0.970	12	0.153	0.2690	3.61	0.970
Support Skirt (RPV Shell ID Location Adjoining Skirt)	29	LAS	0.022	N/A	5.31	0.116	29	0.022	N/A	4.80	0.105
Main Closure Flange (ID)	7	LAS	N/A [3]	0.0044	7.68	0.034	7	N/A [3]	0.0044	7.47	0.033
CRD Housing Penetration	4	SS	0.0120	0.0417	4.34	0.181	4	0.0120	0.0417	4.34	0.181

[1] These environmentally-adjusted fatigue usage values for the Recirculation Outlet nozzles are bounding for the Recirculation Inlet nozzles.
[2] The fatigue usage value of 0.064 is the 60-year environmentally-adjusted fatigue usage value for the feedwater nozzle forging blend radius resulting from the thermal and pressure design transients for the feedwater nozzles. There is an additional contribution to fatigue in the analysis that results from rapid cycling due to assumed bypass leakage around the seals between the thermal sleeve and the feedwater nozzle. The rapid cycling fatigue usage through 40 years of operation is 0.035 but is projected to increase up to 0.772 by 51 years of operation. The feedwater nozzle is qualified for 60 years operation with a total fatigue usage of 0.064 + 0.772 = 0.836 based upon assumed seal refurbishment or reanalysis prior to exceeding 51 years of operation.
[3] The original ASME Code fatigue analysis provided a bounding CUF value for a location that does not contact reactor coolant. Therefore, a new analysis was prepared for this evaluation which was performed using the fatigue curve from NUREG/CR-6909. There was no CUF value computed using the ASME Code curve.

Table 4.3.3-2
Unit 1 and Unit 2 Class 1 Piping System Environmental Fatigue Analysis Results

Class 1 Piping Systems and Data			Unit 1 Piping CUF_{en} Results				Unit 2 Piping CUF_{en} Results				
Piping System [9]	**Node**	**Material**	**Current ASME CUF**	**6909 CUF**	**6909 F_{en}**	**CUF_{en}**	**Node**	**Current ASME CUF**	**6909 CUF**	**6909 F_{en}**	**CUF_{en}**
NUREG/CR-6260 Locations Ranked Highest CUF_{en} to Lowest											
RHR Supply and Return	160	SS	0.9836	0.4618	2.08	0.9620 [2]	160	0.9836	0.4618	2.08	0.9620 [2]
Low Pressure Coolant Injection (LPCI)	95	SS	0.8269	0.4527	2.09	0.9444	95	0.8269	0.4527	2.09	0.9444
Feedwater	100	CS	0.8011	0.4934	1.88	0.9294	100	0.8011	0.4934	1.88	0.9294
Reactor Recirculation	240	SS	0.2918	0.3505	2.51	0.8783 [3]	240	0.0861	0.1056	2.49	0.2632
Core Spray	75	SS	0.3339	0.1963	4.36	0.8563 [4]	115	0.5367	0.2721	2.89	0.7864 [3]
Other Locations Ranked Highest CUF_{en} to Lowest											
Reactor Water Clean Up (RWCU)	722	SS	0.6964	0.4360	2.29	0.9990 [1][6][7]	722	0.7513	0.4210	2.35	0.9879 [1][5][7]
Recirculation Drain	10	SS	0.2293	0.1241	6.47	0.8035 [2]	10	0.2293	0.1241	6.47	0.8035 [2]
Main Steam (Line C)	59	CS	0.2680	N/A	2.65	0.7101	59	0.2680	N/A	2.65	0.7101
MSIV Drains	260,41	CS	0.0211	N/A	7.16	0.1511	145	0.0798	N/A	6.97	0.5562
Standby Liquid Control (SLC)	485	SS	0.4705	0.3541	2.08	0.7365	485	0.2042	0.1836	2.08	0.3825

Table 4.3.3-2
Unit 1 and Unit 2 Class 1 Piping System Environmental Fatigue Analysis Results

Class 1 Piping Systems and Data			Unit 1 Piping CUF_{en} Results				Unit 2 Piping CUF_{en} Results				
Piping System [9]	**Node**	**Material**	**Current ASME CUF**	**6909 CUF**	**6909 F_{en}**	**CUF_{en}**	**Node**	**Current ASME CUF**	**6909 CUF**	**6909 F_{en}**	**CUF_{en}**
MSIV Drain and Test	265	CS	0.0478	N/A	7.16	0.3422	517	0.0204	N/A	6.97	0.1422
RCIC Steam Supply	391	CS	0.2674	N/A	1.00 [8]	0.2674	148	0.0765	N/A	1.00 [8]	0.0765
Instrumentation	10	SS	0.0148	0.0356	5.70	0.2032	10	0.0148	0.0356	5.70	0.2032
Head Vent	28	CS	0.0891	0.0035	1.00 [8]	0.0035	292	0.5044	0.1044	1.00 [8]	0.1044
HPCI Steam Supply	210	CS	0.0842	N/A	1.00 [8]	0.0842	210	0.0842	N/A	1.00 [8]	0.0842
Safeguard Piping Fill	276	CS	0.0047	N/A	1.88	0.0088	890	0.0021	N/A	1.88	0.0039

[1] OBE cycles have been reduced from 50 cycles to 10 cycles.
[2] OBE cycles have been reduced from 50 cycles to 20 cycles.
[3] OBE cycles have been reduced from 50 cycles to 30 cycles.
[4] OBE cycles have been reduced from 50 cycles to 40 cycles.
[5] Shutdown cycles have been reduced from 120 cycles to 52 cycles.
[6] Shutdown cycles have been reduced from 120 cycles to 80 cycles.
[7] Loss of RWCU cycles have been reduced from 240 cycles to 150 cycles.
[8] The F_{en} multiplier of 1.00 is used because the internal environment is dry steam.
[9] This table uses plant-specific system names referenced in the stress reports. These systems are all included in the Reactor Coolant Pressure Boundary license renewal system.

4.3.4 REACTOR VESSEL INTERNALS FATIGUE ANALYSES

TLAA Description:

LGS 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:

The fatigue analyses 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. As previously shown on Tables 4.3.1-1 and 4.3.1-2, transient cycle projections were prepared that demonstrate these design transient cycle limits will not be exceeded in 60 years. Therefore, these analyses will remain valid through the period of extended operation.

TLAA Disposition: 10 CFR 54.21(c)(1)(i) – The reactor vessel internals fatigue analyses remain valid for the period of extended operation.

4.3.5 HIGH ENERGY LINE BREAK (HELB) ANALYSES BASED UPON FATIGUE

TLAA Description:

High Energy Line Break (HELB) analyses for LGS used the CUF values from the ASME Class 1 fatigue analyses as input in determining intermediate break locations. Locations with a CUF value less than 0.10 did not always require a break to be postulated. Since the HELB analyses are based on the Class 1 fatigue TLAAs that provided the CUF values, 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 determined the 40-year transient cycle limits will not be exceeded in 60 years. The Class 1 piping fatigue analyses were demonstrated to remain valid for the period of extended operation. Therefore, the HELB break determinations based upon these fatigue analyses will also remain valid for the period of extended operation.

TLAA Disposition: 10 CFR 54.21(c)(1)(i) – The HELB break determinations remain valid for 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 time-limited aging analyses (TLAAs) for LGS. 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 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.

<u>Environmental Qualification Program Background</u>

The LGS 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 inscope-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, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment," July 1981, and RG 1.89, Revision 1, "Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants," June 1984 (Reference 4.7.22).

Compliance with 10 CFR 50.49 provides reasonable assurance that the component can perform its intended functions during accident conditions after experiencing the effects of in-service aging. The LGS 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 LGS 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 LGS EQ Program, which implements the requirements of 10 CFR 50.49, as further defined and clarified by NUREG-0588 (Reference 4.7.23) and RG 1.89, Revision 1, 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 LGS 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 LGS 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 (10 CFR 50.49) and determined that it is an acceptable aging management program to address environmental qualification according to 10 CFR 54.21(c)(1)(iii). The evaluation referred to in the Standard Review Plan for License Renewal contains sections on “EQ Component Reanalysis Attributes, Evaluation, and Technical Basis” that is the basis of the description provided below.

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 LGS 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 LGS 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 LGS 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 LGS 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

LGS 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 LGS 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.

TLAA Disposition: 10 CFR 54.21(c)(1)(iii) – The effects of aging on the intended function(s) will be adequately managed for the period of extended operation. The LGS EQ Program has been demonstrated to be capable of programmatically managing the qualified lives of the components falling within the scope of the program for license renewal. The continued implementation of the LGS EQ Program provides reasonable assurance that the aging effects will be managed and that EQ components will continue to perform their intended functions for the period of extended operation. This result meets the requirements of 10 CFR 54.21(c)(1)(iii). A comparison of the LGS Environmental Qualification (EQ) of Electric Components (B.3.1.2) program to the corresponding program in NUREG-1801 is provided in Appendix B, Subsection B.3.1.2.

4.5 CONTAINMENT LINER AND PENETRATIONS FATIGUE ANALYSIS

4.5.1 CONTAINMENT LINER AND PENETRATIONS FATIGUE ANALYSES

TLAA Description:

The LGS primary containment liner plate was analyzed for transient cycles predicted to occur in 40 years. Stresses in the liner plate and anchorage system (welds and anchors) from mechanical loads such as MSRV discharge and chugging were evaluated. Primary plus secondary membrane plus bending stresses were evaluated in accordance with ASME Section III, Subsection NE-3222.2. Fatigue strength evaluation was performed according to Subsection NE-3222.4. Allowable design stress intensity values, design fatigue curves, and material properties used in the evaluation conform to Subsection NA, Appendix I. The liner plate fatigue analysis has been identified as a TLAA.

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, the equipment hatches, the personnel lock, the suppression chamber access hatches, the CRD removal hatch, and piping and electrical penetrations. A portion of each of the penetration sleeves extends beyond the containment wall and is not backed by concrete. The entire length of any penetration sleeve is considered a Class MC component. The Class MC components were assessed for Mark II hydrodynamic loads resulting from MSRV discharge and LOCA phenomena. They were also analyzed for 500 startup and shutdown cycles and one Design Basis Accident. The fatigue analyses for ASME Class MC components have been identified as TLAAs.

Class 1 fatigue analyses were also performed for flued-head penetrations associated with the following piping systems: Main Steam, RCIC Steam, HPCI Steam, RHR Supply and Return, Reactor Water Cleanup, Standby Liquid Control, and LPCI injection. These fatigue analyses based upon the same design transients as the Class 1 piping systems they are associated with. These analyses have been identified as TLAAs.

TLAA Evaluation:

Tables 4.3.1-1 and 4.3.1-2 show the results of 60-year transient cycle projections. They demonstrate that the 40-year transient cycle limits will not be exceeded in 60 years based upon the average rate of occurrence to-date. This includes startup and shutdown cycles and Design Basis Accident events. An operational review was performed for the MSRV lift cycles that concluded the total number of cycles, projected for 60 years, will not exceed the number analyzed for 40 years. Therefore, the analyses based upon these transients will remain valid for the period of extended operation.

TLAA Disposition: 10 CFR 54.21(c)(1)(i) – The analyses remain valid for the period of extended operation.

4.6 OTHER PLANT-SPECIFIC TIME-LIMITED AGING ANALYSES

4.6.1 REACTOR ENCLOSURE CRANE CYCLIC LOADING ANALYSIS

TLAA Description:

The LGS reactor enclosure crane is common to both units and is within the scope of license renewal. It was designed to meet the fatigue requirements of the Crane Manufacturers Association of America (CMAA) Specification 70 for a Class A, Standby or Infrequent Service Crane, as discussed in UFSAR Section 9.1.5.2, Reactor Enclosure Crane, Equipment Design. This evaluation of 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 enclosure 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 cycles to the 40-year design cycles.

The reactor enclosure crane is designed in accordance with CMAA Specification 70. Referring to Table 2.8-1 of CMAA Specification 70 (2004), the reactor enclosure crane was purchased as 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 a minimum of 20,000 cycles. UFSAR Section 9.1.5.2 also supports this conclusion.

Table 4.6.1-1 provides the 60-year projections for reactor enclosure crane load cycles. The number of cycles projected for 60 years of operation is 3,468 cycles.

The 60-year projected number of cycles is less than 20 percent of the minimum allowable design value of 20,000 cycles. Therefore, the reactor enclosure 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 4.6.1-1
Unit 1 and Unit 2 Reactor Enclosure Crane Load Cycles

Heavy Load Description	Frequency	Number of Years	Total Cycles
Plant Construction Cycles:			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
Shield Plugs (1-10)	20 / year	60	1200
Dryer/Separator Canal Plugs	6 / year	60	360
Work Platform	2 / year	60	120
Miscellaneous	4 / year	60	240
ISFSI Transfer Cask Load Cycles – 2008:	8 / year	1	8
ISFSI Transfer Cask Load Cycles – 2009:	20 / year	1	20
ISFSI Transfer Cask Load Cycles – 2010 – 2049:	24 / year	40	960
60-Year Total Load Cycles:			3468
Minimum Design Limit			20,000
Percent of Load Cycle Limit at 60 Years:			17.3%

4.6.2 EMERGENCY DIESEL GENERATOR ENCLOSURE CRANES CYCLIC LOADING ANALYSIS

TLAA Description:

LGS has eight emergency diesel generator enclosure cranes within the scope of license renewal. These cranes were designed to meet or exceed the design fatigue requirements of the Crane Manufacturers Association of America (CMAA) Specification 70 for Class A, "Standby or Infrequent Service Cranes," per purchase specification requirements. This evaluation of cycles expected over the 40-year life is the basis of a safety determination and has therefore been identified as a TLAA that requires evaluation for the period of extended operation.

TLAA Evaluation:

The emergency diesel generator enclosure cranes were evaluated for the period of extended operation by developing 60-year projections for crane load cycles and comparing these projected cycles to the number of cycles evaluated for the design life of the cranes. The emergency diesel generator enclosure cranes were purchased as Class A cranes. They are considered to be cranes experiencing “irregular occasional use followed by long idle periods,” as described in Table 2.8-1 of CMAA Specification 70 (2004). For this category of crane, the CMAA design requirements permit a minimum of 20,000 load cycles.

Since CMAA Specification 70 does not define a minimum load threshold below which a cycle is not counted, the 60-year load cycle projection includes all load cycles. A conservative estimate as determined from review of station procedures and personnel knowledgeable on the use of these cranes results in approximately 3,500 load cycles through the period of extended operation. This estimate is for each crane and is based on an estimated 500 load cycles during original construction and 50 load cycles per year during diesel generator maintenance. The 3,500 load cycles are less than 20 percent of the allowable design value of 20,000 cycles. Therefore, the analysis of the emergency diesel generator enclosure cranes remains valid for the period of extended operation.

TLAA Disposition: 10 CFR 54.21(c)(1)(i) – The analysis remains valid for the period of extended operation.

4.6.3 RPV CORE PLATE RIM HOLD-DOWN BOLT LOSS OF PRELOAD

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 27.5 inches long. The bolts were preloaded during initial installation but are subject to stress relaxation (loss of preload) as a result of thermal and irradiation (fluence) effects. An analysis was performed that 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 determined that the maximum relaxation value of 19 percent is applicable to an average fluence level of 8.0 E+19 n/cm^2 over the entire length of the bolt located at the peak azimuthal location. Since this analysis evaluated fluence 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 LGS for 57 EFPY for the reactor vessel beltline components and for selected reactor vessel internal components. A 57 EFPY fluence evaluation was prepared for the core plate rim bolts that determined the azimuthal locations of the bolts with the highest fluence. Due to core symmetry, there are four bolts with a bounding peak fluence value of 2.96 E+20 n/cm^2 at 57 EFPY at the top of the bolt. In order to determine the average fluence value along the length of the bolt, fluence projections were made at 75 discrete points along the length of the bolt on the bolt surface nearest the core. The 57 EFPY fluence value at the bottom of the bolt is 9.85 E+16 n/cm^2. The individual fluence values were integrated and the result was divided by the length of the bolt, resulting in an average fluence value of 3.37 E+19 n/cm^2 along the length of the bolt. This is well below the 8.0 E+19 n/cm^2 fluence value previously evaluated. Therefore, the TLAA has been demonstrated to remain valid for the period of extended operation.

TLAA Disposition: 10 CFR 54.21(c)(1)(i) – The analysis remains valid for the period of extended operation.

4.6.4 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 (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 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 to within allowable regulatory limits.

There is no specific analysis of main steam line flow restrictor erosion other than that discussed in UFSAR Section 5.4.4, summarized below. 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.

TLAA Evaluation:

The resistance of stainless steel to erosion has been substantiated 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 analysis for LGS indicates that the calculated integrated mass of coolant leaving the reactor through the main steam line break is 108,785 lb., of which 88,333 lb. is liquid and 20,452 lb. is steam. The analysis uses the bounding value of 140,000 lb. coolant release as provided in Standard Review Plan 15.6.4, Paragraph III.2.a for a GESSAR-251 plant. A postulated erosion rate resulting in an additional 5 percent increase in choked flow rate (10 percent total) during the period of extended operation would not challenge the use of 140,000 lb coolant release as a bounding input to the dose calculation. Therefore, the potential erosion loss remains within previously analyzed limits and is considered to remain valid.

TLAA Disposition: 10 CFR 54.21(c)(1)(i) – The analysis remains valid for the period of extended operation.

4.6.5 JET PUMP AUXILIARY SPRING WEDGE ASSEMBLY

TLAA Description:

The LGS jet pump assemblies have had auxiliary spring wedge assemblies designed and installed to maintain lateral support for the jet pump inlet mixer. The design analysis considered potential aging effects based upon a design life of 40 years, including fatigue usage and relaxation in bolt preload due to neutron fluence. The first auxiliary spring wedge assembly was installed in Unit 1 in March 2004 and will have a design life of 40.7 years by the end of the period of extended operation in October 2044. The first auxiliary spring wedge assembly was installed in Unit 2 in March 2005 and will have a design life of 44.3 years by the end of the period of extended operation in June 2049. Therefore these analyses have been identified as TLAAs.

TLAA Evaluation:

The jet pump auxiliary spring wedge assembly is not an ASME Code component. However, it was evaluated using stress and fatigue limits of the ASME Code as guidelines. The cumulative fatigue usage for applicable Service Level B loads was required to be less than the allowable limit of 1.0. The original design basis load cycles from the reactor vessel thermal cycle diagram were applied. These are the same transients as those from UFSAR Table 3.9-2 (Reference 4.7.18) previously described in LRA Section 4.3.1. The resulting fatigue usage was determined to be 0.77, which is below the allowable limit of 1.0. LRA Tables 4.3.1-1 and 4.3.2-2 show the 60-year transient projections for LGS that demonstrate these transient cycle limits will not be exceeded in 60 years of operation. Therefore, the fatigue TLAA has been demonstrated to remain valid for the period of extended operation.

The auxiliary spring wedge assembly design analysis was also required to evaluate relaxation in the bolt preload due to integrated neutron fluence of 1.4 E+20 n/cm^2 for a 40-year design life. The analysis concluded that all design requirements were met for the 40-year design life of the component.

In order to evaluate relaxation in the bolt preload for the period of extended operation, RAMA fluence projections for the jet pump riser brace weld RS-9 location have been applied because they are bounding for all locations on the jet pump, including the location lower on the jet pump where the auxiliary spring wedge assembly is installed. The RS-9 weld attaches the riser brace to the riser pipe, located at approximately the 304 inch elevation, while the auxiliary spring wedge assembly is located at approximately the 230 inch elevation where the fluence values are lower.

The fluence projection for the Unit 1 jet pump auxiliary spring wedge assemblies through the period of extended operation is 1.30 E+20 n/cm^2 and for Unit 2 is 1.33 E+20 n/cm.^{2} These values are less than the 1.4 E+20 n/cm^2 fluence value used in the design, which shows that the auxiliary spring wedge assemblies will not reach the previously evaluated fluence value. Therefore, the analysis has been demonstrated to remain valid for the period of extended operation.

TLAA Disposition: 10 CFR 54.21(c)(1)(i) – The analysis remains valid for the period of extended operation.

4.6.6 JET PUMP RESTRAINER BRACKET PAD REPAIR CLAMPS

TLAA Description:

Visual inspections at LGS have found wear at the inlet-mixer wedge/restrainer bracket pad interface on several jet pumps. A repair clamp has been designed and installed that replaces the support function of the restrainer bracket pad. The repair clamp design analysis evaluated end-of-life preload relaxation for 40 years. This analysis has been identified as a TLAA.

TLAA Evaluation:

The following information is provided from the 40-year TLAA identified above. The jet pump repair clamp uses four clamping bolts that are each loaded to a minimum preload of 1,380 lbs at the minimum installation temperature of 70 degrees F. The bolt preload will decrease by 10 percent to 1,243 lbs at the 550 degrees F operating temperature. Therefore, the four bolts will apply a minimum beginning-of-life preload of 4,972 lbs. This minimum beginning-of-life preload will further decrease by 5 percent due to thermal and radiation-induced relaxation due to 40 years of operation, resulting in an end-of-life preload of 4,724 lbs. This load was used in the clamping evaluation described below.

For the static friction coefficient of 0.5, the minimum end-of-life bolt preload will provide a resistance to sliding under lateral loads of 4,724 x 0.5 = 2,362 lbs. This is larger than the limiting lateral load of 2,059 lbs. Therefore, clamping will be maintained under all operating conditions.

In order to evaluate this TLAA for an additional 20 years, the preload values will be assumed to decrease a further 5 percent due to thermal and radiation-induced relaxation, the same decrease originally predicted for the first 40 years of operation. Therefore, the preload from the four bolts will be reduced from 4,724 lbs to 4,476 lbs. When the static friction coefficient is applied, the minimum 60-year end-of-life bolt preload will be 4,476 x 0.5 = 2,238 lbs. This is larger than the limiting lateral load of 2,059 lbs. Therefore, clamping will continue to be maintained under all operating conditions through the period of extended operation.

The clamp design analysis also evaluated fatigue. However, the stress amplitude for cyclic loads was well below the ASME Code stress limit of 13,600 psi for 10^{11} cycles and less than the 10,000 psi lower limit considered for flow-induced vibration stress cycles. Therefore, the fatigue usage will be insignificant. Therefore, even if the number of cycles increased 50 percent during the period of extended operation, the fatigue usage would remain insignificant.

TLAA Disposition: 10 CFR 54.21(c)(1)(ii) – The analysis has been projected to the end of the period of extended operation.

4.6.7 REFUELING BELLOWS AND SUPPORT CYCLIC LOADING ANALYSIS

TLAA Description:

A refueling bellows provides a flexible seal to prevent leakage from the reactor well during refueling operations when it is flooded to permit fuel movement. It is located between the reactor vessel bellows support and the containment seal plate. The bellows support and bellows assembly were analyzed for cycles predicted to bound 40 years of operation. Therefore, this fatigue analysis has been identified as a TLAA that requires evaluation for 60 years.

TLAA Evaluation:

The refueling bellows and support were analyzed for the following events: 120 startup – shutdown cycles, 130 hydrotest cycles, 123 refueling cycles, 180 scrams, 10 preoperational blowdowns, and 10 loss of A/C power cycles. Unit 1 has had 13 refueling cycles to-date and Unit 2 has had 11 refueling cycles. Since the refueling outages are scheduled once every two years, the 123 cycles analyzed will remain bounding for 60 years of operation. For the remainder of these cycles, the 60-year transient cycle projections described in section 4.3.1 determined that these transient cycle limits will not be exceeded in 60 years. Therefore, the fatigue analyses for the refueling bellows and refueling bellows support will remain valid for the period of extended operation.

TLAA Disposition: 10 CFR 54.21(c)(1)(i) – The analyses remain valid for the period of extended operation.

4.6.8 DOWNCOMERS AND MSRV DISCHARGE PIPING FATIGUE ANALYSES

TLAA Description:

Downcomer vents and Main Steam Relief Valve (MSRV) discharge piping penetrate the drywell and suppression pool diaphragm slab with the purpose of transporting steam and noncondensible gases to the suppression pool from the reactor and from the drywell 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.

A Class 1 fatigue analysis was performed for the portion of the downcomers in the air space of the suppression chamber. The significant area analyzed for the downcomers in the suppression pool air space was the downcomer penetration through the diaphragm slab. Structural analyses were performed for of all the MSRV discharge lines from the diaphragm slab penetration to the quencher, including flued-head penetrations, elbows, tees, taper transitions, and three-way restraint attachments.

The downcomers and MSRV discharge lines 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 in accordance with the equations of Subsection NB-3600 of the ASME Code. Therefore, these Class 1 fatigue analyses have been identified as TLAAs that require evaluation for 60 years.

TLAA Evaluation:

The MSRV downcomers and bracing inside the suppression chamber, the MSRV discharge piping, and the main steam piping have been evaluated for transient cycles predicted to occur in 40 years. A minimum of 7,700 MSRV cycles were considered to account for the pool dynamic loads, based on 1,100 actuations of all MSRVs times seven stress cycles per actuation. For the most frequently actuated MSRVs, the analysis was based on 4,700 actuations times three stress cycles per actuation (14,100 total cycles). The quenchers were analyzed for 7,000 SRV opening and closing cycles and 1,000,000 irregular condensation load cycles.

An operational review was performed for the MSRV lift cycles that concluded the total number of cycles, projected for 60 years, will not exceed the number analyzed for 40 years. Therefore, the fatigue analyses for the downcomers and MSRV discharge piping will remain valid for the period of extended operation.

TLAA Disposition: 10 CFR 54.21(c)(1)(i) – The analyses remain valid for the period of extended operation.

4.6.9 JET PUMP SLIP JOINT REPAIR CLAMPS

TLAA Description:

Jet pump slip joint repair clamps have been designed and installed at LGS to minimize vibration and wear of the jet pump assemblies. 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. This functions to damp out jet pump vibration. The design specification for the repair clamp stated that the peak neutron fluence at the slip joint is 1.115 E+20 n/cm^2. The specification required the design to account for the effect of fluence on the properties of the slip joint materials for the design life of the clamp, which is 40 years. The structural evaluation stated that the "cold" bolt preload is 550 lbs at 100 degrees F and the maximum preload for operating condition is 500 lbs at 550 degrees F with a minimum, end-of-life preload of 350 lbs at 550 degrees F. Therefore, the 150 lbs of preload loss during the life of the component is associated with neutron fluence. The clamps will be in service over 40 years by the end of the period of extended operation. Therefore, loss of preload due to neutron fluence has been identified as a TLAA.

TLAA Evaluation:

Jet pumps and repair hardware are required to be periodically inspected by the Reactor Vessel Internals program. Aging effects that are included within the scope of these inspections are cracking, wear and bolt loosening. Therefore, this TLAA will be managed for the period of extended operation.

TLAA Disposition: 10 CFR 54.21(c)(1)(iii) – The effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

4.7 REFERENCES

4.7.1 BWRVIP-126, "BWR Vessel and Internals Project, RAMA Fluence Methodology Software," Version 1.0, EPRI, Palo Alto, CA, 2003, 1007823

4.7.2 USNRC Regulatory Guide 1.190, "Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence", March 2001

4.7.3 USNRC Regulatory Guide 1.99, "Radiation Embrittlement of Reactor Vessel Materials", Revision 2, May 1988

4.7.4 BWROG-94037, "BWR Owners' Group Topical Report on Upper Shelf Equivalent Margin analysis-Approved Version", March 21, 1994

4.7.5 NEDO-32205-A, "10 CFR 50 Appendix G Equivalent Margins Analysis for Low Upper Shelf Energy in BWR/2 through BWR/6 Vessels", GE, San Jose, CA, Revision 1, February 1994

4.7.6 USNRC Regulatory Guide 1.161, "Evaluation of reactor Pressure Vessels with Charpy Upper-Shelf Energy Less Than 50 ft-lb", June 1995

4.7.7 American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, "Rules for In-Service Inspection of Nuclear Power Plant Components", Appendix K, 1992 Edition with 1993 Addenda

4.7.8 BWRVIP-135, "BWR Vessel and Internals Project, Integrated Surveillance Program (ISP) Data Source Book and Plant Evaluations", Revision 1

4.7.9 Letter dated April 8, 2011 from USNRC to Mr. Michael J. Pacilio of Exelon Nuclear, "Limerick Generating Station, Units 1 and 2 – Issuance of Amendments Re: Measurement Uncertainty Recapture Power Uprate and Standby Liquid Control System Changes (TAC Nos. ME3589, ME3590, ME3591, and ME3592), Safety Evaluation by the Office of Nuclear Reactor Regulation Related to Amendment No. 201 to Facility Operating License No. NPF-39 and Amendment No. 163 to Facility Operating License No. NPF-85, Exelon Generation Company, LLC, Limerick Generating Station, Units 1 and 2, Docket Nos. 50-352 and 50-353."

4.7.10 BWRVIP-135, "BWR Vessel and Internals Project, Integrated Surveillance Program (ISP) Data Source Book and Plant Evaluations", Revision 2

4.7.11 D. A. Helker, PECO Nuclear, letter to NRC, "Limerick Generating Station, Units 1 and 2 Submittal of Relief Requests Concerning Reactor Pressure Vessels and ASME Section XI Code Cases", January 30, 1998

4.7.12 USNRC SER for Docket Nos. 50-352 and 50-353, Safety Evaluation by the office of Nuclear Regulation of the First and Second 10-Year Interval Inservice Inspection Plan Request for Relief Nos. RR-01 (Parts 1 and 2), RR-05, RR-11, RR-12 (Parts 1 through 5), and RR-23 for Limerick Generating Station Units 1 and 2, PECO Energy Company (TAC Nos. MA0818 and MA08109) dated September 13, 1999

4.7.13 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

4.7.14 BWRVIP-05, BWR Vessel and Internals Project, BWR Reactor Pressure Vessel Shell Weld Inspection Recommendations (BWRVIP-05), September 1995

4.7.15 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

4.7.16 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

4.7.17 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

4.7.18 Limerick Generating Station, Units 1 and 2, Updated Final Safety Analysis Report (UFSAR), Revision 14, September 29, 2008

4.7.19 NUREG/CR-6260, "Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components", March 1995

4.7.20 NUREG/CR-6909, "Effect of LWR Coolant Environments on Fatigue Life of Reactor Materials", Final Report, February 2007

4.7.21 EPRI, "BWR Vessel and Internals Application (BWRVIA) for Radiolysis and ECP Analysis", Version 3.0 (1015470), Palo Alto, CA, December 10, 2008

4.7.22 USNRC Regulatory Guide 1.89, "Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants", Revision 1, June 1984

4.7.23 NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment", Revision 1, July 1981

APPENDIX A
UPDATED FINAL SAFETY ANALYSIS REPORT SUPPLEMENT
TABLE OF CONTENTS

A.1 Introduction

The application for a renewed operating license is required by 10 CFR 54.21(d) to include a UFSAR Supplement. This appendix, which includes the following sections, comprises the UFSAR supplement:

- Section A.1.1 contains a listing of the aging management programs that correspond to NUREG-1801 Chapter XI programs, 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.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 – Requires Enhancement]
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]
16. BWR Reactor Water Cleanup System (Section A.2.1.16) [Existing]
17. Fire Protection (Section A.2.1.17) [Existing – Requires Enhancement]
18. Fire Water System (Section A.2.1.18) [Existing – Requires Enhancement]
19. Aboveground Metallic Tanks (Section A.2.1.19) [Existing – Requires Enhancement]

20. Fuel Oil Chemistry (Section A.2.1.20) [Existing – Requires Enhancement]

21. Reactor Vessel Surveillance (A.2.1.21) [Existing]

22. One-Time Inspection (Section A.2.1.22) [New]

23. Selective Leaching (A.2.1.23) [New]

24. One-Time Inspection of ASME Code Class 1 Small-Bore Piping (Section A.2.1.24) [New]

25. External Surfaces Monitoring of Mechanical Components (Section A.2.1.25) [New]

26. Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (Section A.2.1.26) [New]

27. Lubricating Oil Analysis (Section A.2.1.27) [Existing]

28. Monitoring of Neutron-Absorbing Materials Other than Boraflex (Section A.2.1.28) [Existing – Requires Enhancement]

29. Buried and Underground Piping and Tanks (Section A.2.1.29) [Existing – Requires Enhancement]

30. ASME Section XI, Subsection IWE (Section A.2.1.30) [Existing – Requires Enhancement]

31. ASME Section XI, Subsection IWL (Section A.2.1.31) [Existing – Requires Enhancement]

32. ASME Section XI, Subsection IWF (Section A.2.1.32) [Existing – Requires Enhancement]

33. 10 CFR Part 50, Appendix J (Section A.2.1.33) [Existing]

34. Masonry Walls (Section A.2.1.34) [Existing – Requires Enhancement]

35. Structures Monitoring (Section A.2.1.35) [Existing – Requires Enhancement]

36. RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (Section A.2.1.36) [Existing – Requires Enhancement]

37. Protective Coating Monitoring and Maintenance Program (Section A.2.1.37) [Existing – Requires Enhancement]

38. Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (Section A.2.1.38) [New]

39. Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits (Section A.2.1.39) [New]

40. Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (Section A.2.1.40) [New]

41. Metal Enclosed Bus (Section A.2.1.41) [New]

42. Fuse Holders (Section A.2.1.42) [New]

43. Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (Section A.2.1.43) [New]

A.1.2 Plant-Specific Aging Management Programs

None. The Limerick Generating Station, Units 1 and 2 License Renewal Application does not include plant-specific aging management programs.

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. Environmental Qualification (EQ) of Electric Components (Section A.3.1.2) [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 Pressure Vessel Neutron Embrittlement Analysis (Section A.4.2)

2. Metal Fatigue (Section A.4.3)

3. Environmental Qualification (EQ) of Electric Components (Section A.4.4)

4. Containment Liner and Penetrations Fatigue Analysis (Section A.4.5)

5. Other Plant-Specific Time-Limited Aging Analyses (Section A.4.6)

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.2 Aging Management Programs

A.2.1 NUREG-1801 Chapter XI Aging Management Programs

This section provides summaries of the NUREG-1801 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 program that consists of periodic volumetric and visual examinations of components for assessment, identification of signs of degradation, and establishment of corrective actions. The program includes inspections performed to identify and manage cracking and loss of fracture toughness in Class 1, 2, and 3 piping and components exposed to reactor coolant and treated water environments. The inspections will be implemented in accordance with 10 CFR 50.55(a) and ASME Code, Section XI Subsections IWB, IWC, and IWD. These activities include inspections, and monitoring and trending of results to confirm that aging effects are managed.

A.2.1.2 Water Chemistry

The Water Chemistry aging management program is an existing program whose activities consist of monitoring and control of water chemistry to manage the aging of reactor vessel, reactor internals, piping, piping elements and piping components, heat exchangers and tanks that are exposed to treated water. The Water Chemistry aging management program keeps peak levels of various contaminants below system-specific limits based on industry recognized guidelines of EPRI, BWR Vessel and Internals Project BWR Water Chemistry Guidelines for the prevention or 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. To mitigate aging effects on component surfaces the chemistry program is used to control water chemistry for impurities that accelerate corrosion.

A.2.1.3 Reactor Head Closure Stud Bolting

The Reactor Head Closure Stud Bolting program is an existing program that provides for condition monitoring and preventive activities to manage reactor head closure studs and associated nuts, bushings, washers and flange threads for cracking and loss of material. The program is implemented through station procedures based on the examination and inspection requirements specified in ASME Section XI, Table IWB-2500-1 and preventive measures described in NRC Regulatory Guide 1.65, “Materials and Inspection for Reactor Vessel Closure Studs.”

A.2.1.4 BWR Vessel ID Attachment Welds

The BWR Vessel ID Attachment Welds aging management program is an existing aging management program that incorporates the inspection and evaluation recommendations of BWRVIP-48-A, and the recommendations described in the Water Chemistry (A.2.1.2) program. The program is implemented through station procedures that provide for mitigation of cracking through management of reactor water chemistry and monitoring for cracking through in-vessel examinations of the reactor vessel internal attachment welds. Reactor vessel attachment weld inspections are implemented through station procedures that are part of augmented inservice inspection requirements.

A.2.1.5 BWR Feedwater Nozzle

The BWR Feedwater Nozzle aging management program is an existing program that manages the effects of cracking in the feedwater nozzles by augmented in-service 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, Revision 1. Inspections of the feedwater nozzles are performed in accordance with the ISI Program Plan.

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 program that provides for condition monitoring of the CRDRL reactor pressure vessel nozzle for cracking. The CRDRL nozzle has been capped to mitigate thermal fatigue cracking on both units. The program performs In-service Inspection (ISI) examinations to monitor the effects of cracking on the intended function of the CRDRL nozzle. 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 and nozzle-to-vessel weld examinations are performed at the frequency specified in ASME Code, Section XI, Table IWB-2500-1. 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.

The BWR Control Rod Drive Return Line Nozzle aging management program will be enhanced to:

1. Specify an extended volumetric inspection of the nozzle-to-cap weld to assure that the inspection includes base metal to a distance of one pipe wall thickness or 0.5 inches, whichever is greater, on both sides of the weld.

This enhancement will be implemented prior to the period of extended operation.

A.2.1.7 BWR Stress Corrosion Cracking

The BWR Stress Corrosion Cracking aging management program is an existing augmented Inservice Inspection program that manages intergranular stress corrosion cracking (IGSCC) in reactor coolant pressure boundary piping and piping components made of stainless steel and nickel based alloy 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 for normal water chemistry conditions, and staff-approved EPRI Topical Report TR-112657, Revision B-A, Final Report, “Risk-Informed Inservice Inspection Evaluation Procedure,” December 1999.

A.2.1.8 BWR Penetrations

The BWR Penetrations aging management program is an existing program that manages the effects of cracking of reactor vessel instrumentation penetrations, and CRD housing and incore-monitoring housing penetrations exposed to reactor coolant through water chemistry and in-service inspections. The scope of the program includes beltline instrumentation nozzles and other instrumentation nozzles; except for the core plate differential pressure (dP) instrumentation nozzle and the jet pumps instrumentation nozzles, which are in the scope of the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (A.2.1.1) program. The BWR Penetrations aging management 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," and the water chemistry recommendations described in the Water Chemistry (A.2.1.2) program.

BWRVIP-27-A does not apply to LGS because Standby Liquid Control (SLC) injects through the Core Spray piping. Inspections of the instrument penetrations and CRD housing and incore-monitoring housing penetrations are implemented through station ISI procedures, which incorporate the requirements of ASME Section XI. The requirements of ASME Section XI are implemented in accordance with 10 CFR 50.55(a).

A.2.1.9 BWR Vessel Internals

The BWR Vessel Internals program is an existing 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 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 Cast Austenitic Stainless Steel (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 Cast Austenitic Stainless Steel (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.

These enhancements will be implemented prior to the period of extended operation. The initial inspections will be performed either prior to or within 5 years after entering the period of extended operation.

A.2.1.10 Flow-Accelerated Corrosion

The Flow-Accelerated Corrosion (FAC) aging management program is an existing program based on EPRI guidelines in NSAC-202L, "Recommendations for an Effective Flow Accelerated Corrosion Program." The program provides guidance for prediction, detection, and monitoring wall thinning in piping and fittings, valve bodies, and heat exchangers due to FAC. 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 in pipes, fittings, and feedwater heater shells. Program activities include analyses to determine critical locations, baseline inspections to determine the extent of thinning at these critical locations, and follow-up inspections to confirm the predictions. Repairs and replacements are performed as necessary.

A.2.1.11 Bolting Integrity

The Bolting Integrity aging management program is an existing program that provides for aging management for loss of material and loss of preload of pressure retaining bolted 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 TR-104213, “Bolted Joint Maintenance & Applications Guide,” and EPRI NP 5769, “Degradation and Failure of Bolting in Nuclear Power Plants,” as part of the comprehensive component pressure retaining bolting program. The program provides for managing loss of material and loss of preload by performing visual inspections for pressure retaining bolted joint leakage at least once per refueling cycle. Inspection activities for bolting in a submerged environment are performed in conjunction with component maintenance activities. Inspection activities for bolting in buried and underground applications is performed in conjunction with inspection activities for the Buried and Underground Piping and Tanks (A.2.1.29) aging management program due to the restricted accessibility to these locations.

The Bolting Integrity aging management program is supplemented by aging management activities included in several other programs including ASME Section XI, Inservice Inspection, Subsections IWB, IWC, and IWD (A.2.1.1), Reactor Head Closure Stud Bolting (A.2.1.3), Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (A.2.1.14), External Surfaces Monitoring of Mechanical Components (A.2.1.25), Buried and Underground Piping and Tanks (A.2.1.29), ASME Section XI, Subsection IWE (A.2.1.30), ASME Section XI, Subsection IWF (A.2.1.32), Structures Monitoring (A.2.1.35), and Reg. Guide 1.127 Inspection of Water Control Structures Associated With Nuclear Power Plants (A.2.1.36).

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 components.

2. Prohibit the use of lubricants containing molybdenum disulfide for pressure retaining components.

3. Minimize the use of high strength bolting (actual measured yield strength equal to or greater than 150 ksi) for closure bolting for pressure retaining components. High strength bolting, if used, will be monitored for cracking.

The 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 program that manages heat exchangers, piping, piping elements and piping components in safety-related and nonsafety-related raw water systems that are exposed to raw water and air/gas-wetted environments for loss of material, reduction of heat transfer, and hardening and loss of strength of elastomers. This is accomplished through tests and inspections per the guidelines of NRC Generic Letter 89-13. System and component testing, visual inspections, non-destructive examination (i. e. Radiographic Testing, Ultrasonic Testing and Eddy Current Testing), and chemical injection are conducted to ensure that aging effects are managed such that system and component intended functions and integrity are maintained.

The OCCWS includes those systems that transfer heat from safety-related structures, systems 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 spatial interaction but have no safety-related heat transfer function. Periodic heat transfer testing or inspection and cleaning of heat exchangers with a heat transfer intended function is performed in accordance with LGS commitments to GL 89-13 to verify heat transfer capabilities. Heat exchangers which have no safety-related heat transfer function are periodically inspected and cleaned.

The Open-Cycle Cooling Water System aging management program will be enhanced to:

1. Perform internal inspection of buried Safety Related Service Water Piping when it is accessible during maintenance and repair activities

2. Perform periodic inspections for loss of material in the Nonsafety-Related Service Water System at a frequency in accordance with NRC Generic Letter 89-13.

The 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 mitigation program that includes (a) nitrite-based water treatment, including pH control and the use of corrosion inhibitors for carbon steel and copper alloys, 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; and (b) chemical testing of the water to ensure that the water treatment program maintains the water chemistry within acceptable guidelines. The Closed Treated Water Systems program manages the loss of material and the reduction of heat transfer in piping, piping components, piping elements, tanks, and heat exchangers exposed to a closed treated water environment.

The Closed Treated Water Systems aging management program will be enhanced to:

1. Perform condition monitoring and performance monitoring, including periodic testing and opportunistic and periodic NDE, 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 and inspected at an interval not to exceed once in 10 years during the period of extended operation.

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. Perform annual periodic inspections as defined in the appropriate ASME B30 series standard for all cranes, hoists, and equipment handling systems within the scope of license renewal. For handling systems that are infrequently in service, such as those only used during refueling outages, annual periodic inspections may be deferred until just prior to use.

2. Perform inspections 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.

3. Evaluate loss of material due to wear or corrosion and any loss of bolting preload on cranes, hoists, and equipment handling systems per the appropriate ASME B30 series standard.

4. Perform repairs to cranes, hoists, and equipment handling systems per the appropriate ASME B30 series standard.

Enhancements 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 program that manages piping, piping components, piping elements, and valve bodies for loss of material in the compressed air systems. The Compressed

Air Monitoring aging management activities consist of air quality monitoring and trending, preventive maintenance, and condition monitoring measures to manage the aging effects.

A.2.1.16 BWR Reactor Water Cleanup System

The BWR Reactor Water Cleanup System program is an existing condition monitoring and mitigation program that describes the requirements for augmented inservice inspection (ISI) for stress corrosion cracking (SCC) or intergranular stress corrosion cracking (IGSCC) on stainless steel Reactor Water Cleanup (RWCU) System piping welds outboard of the second (outboard) primary containment isolation valves. The program includes the measures delineated in NUREG-0313, Rev. 2, and in NRC Generic Letter (GL) 88-01 and its Supplement 1. The program is implemented in conjunction with the Water Chemistry (A.2.1.2) program to minimize the potential of cracking due to SCC or IGSCC in a treated water environment. The BWR Reactor Water Cleanup System program activities, and the control of reactor water chemistry, manage the aging effects in stainless steel RWCU System piping welds outboard of the second primary containment isolation valves thereby maintaining the intended function of this piping.

The BWR Reactor Water Cleanup System program includes acceptable inspection alternatives to staff positions delineated in GL 88-01 as described in GL 88-01, Supplement 1. In accordance with the staff's criteria regarding the acceptable inspection schedules for the portion of the RWCU System piping welds outboard of the second primary containment isolation valves, the NRC has approved the elimination of the requirements to perform examinations of the outboard portion of the RWCU System for both LGS Unit 1 and Unit 2. If one or more of the RWCU System welds inboard of the primary containment isolation valves inspected as part of the on-going GL 88-01 inspections under the BWR Stress Corrosion Cracking (A.2.1.7) program have confirmed IGSCC or SCC indications, then an additional sample of RWCU system welds outboard of the primary containment isolation valves is selected and examined based on the requirements of GL 88-01.

A.2.1.17 Fire Protection

The Fire Protection aging management program is an existing program that includes fire barrier visual inspections, and halon and carbon dioxide systems visual inspections and functional tests. 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 dampers is performed to ensure that their functionality is maintained. The program also includes visual inspections and periodic operability tests of halon and 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. Provide additional inspection guidance to identify degradation of fire barrier walls, ceilings, and floors for aging effects such as cracking, spalling and loss of material.

2. Provide additional inspection guidance for identification of excessive loss of material due to corrosion on the external surfaces of the halon and carbon dioxide systems.

Enhancements will be implemented prior to the period of extended operation.

A.2.1.18 Fire Water System

The Fire Water System aging management program is an existing program that provides for system pressure monitoring, fire system header flushing and flow testing, pump performance testing, hydrant flushing, and visual inspection activities. System flow tests measure hydraulic resistance and compare results with previous testing as a means of evaluating the internal piping conditions. Major component types include piping, piping components and piping elements, tanks, pump casings, and valve bodies. Monitoring system piping flow characteristics ensures that signs of loss of material will be detected in a timely manner. Pump performance tests, hydrant flushing and system inspections are based on guidance from the applicable National Fire Protection Association (NFPA) standards. Fire system main header flow tests, sprinkler system inspections, visual yard hydrant inspections, hydrostatic tests, gasket inspections, volumetric inspections, and fire hydrant flow tests and pump capacity tests are performed periodically to assure that aging effects are managed such that the system intended functions are maintained.

The Fire Water System aging management program will be enhanced to:

1. Replace sprinkler heads or perform 50-year sprinkler head testing using the guidance of NFPA 25 “Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems” (2002 Edition), Section 5.3.1.1.1. This testing will be performed prior to the 50-year in-service date and every 10 years thereafter.

2. Inspect selected portions of the water based fire protection system piping located aboveground and exposed to the fire water internal environment by non-intrusive volumetric examinations. These inspections shall be performed prior to the period of extended operation and will be performed every 10 years thereafter.

Enhancements will be implemented prior to the period of extended operation, with the testing and inspections performed in accordance with the schedule described above.

A.2.1.19 Aboveground Metallic Tanks

The Aboveground Metallic Tanks aging management program is an existing program that manages the loss of material aging effect of the Backup Water Storage Tank. Paint is a corrosion preventive measure, and periodic visual inspections will monitor degradation of the paint and any resulting metal degradation of metallic tanks.

The Aboveground Metallic Tanks aging management program will be enhanced to:

1. Include UT measurements of the bottom of the Backup Water Storage Tank. Tank bottom UT inspections will be performed whenever the tank is drained during the period of extended operation and within five years prior to entering the period of extended operation.

2. Provide visual inspections of the Backup Water Storage Tank external surfaces and include, on a sampling basis, removal of insulation to permit inspection of the tank surface. The tank external surface visual inspection will be conducted on a two-year frequency.

These enhancements will be implemented prior to the period of extended operation.

A.2.1.20 Fuel Oil Chemistry

The Fuel Oil Chemistry aging management program is an existing mitigation 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. Periodically drain water from the Fire Pump Engine Diesel Oil Day Tank and the Fire Pump Diesel Engine Fuel Tank.

2. Perform internal inspections of the Fire Pump Engine Diesel Oil Day Tank, the Fire Pump Diesel Engine Fuel Tank, and the Diesel Generator Day Tanks 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, cleaned and the internal surfaces either volumetrically or visually inspected. If evidence of degradation is observed during visual inspections, the diesel fuel tanks will require follow-up volumetric inspection.

3. Perform periodic analysis for total particulate concentration and microbiological organisms for the Fire Pump Engine Diesel Oil Day Tank and the Fire Pump Diesel Engine Fuel Tank.

4. Perform periodic analysis for water and sediment and microbiological organisms for the Diesel Generator Diesel Oil Storage Tanks.

5. Perform periodic analysis for water and sediment content, total particulate concentration, and the levels of microbiological organisms for the Diesel Generator Day Tanks.

6. Perform analysis of new fuel oil for water and sediment content, total particulate concentration and the levels of microbiological organisms for the Fire Pump Engine Diesel Oil Day Tank and the Fire Pump Diesel Engine Fuel Tank.

7. Perform analysis of new fuel oil for total particulate concentration and the levels of microbiological organisms for the Diesel Generator Diesel Oil Storage Tanks.

These enhancements will be implemented prior to the period of extended operation.

A.2.1.21 Reactor Vessel Surveillance

The Reactor Vessel Surveillance aging management program is an existing 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 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 Reactor Vessel Surveillance program is part of the BWRVIP Integrated Surveillance Program (ISP) described in BWRVIP-86-A and BWRVIP-116, 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 in accordance with BWRVIP-116 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.2.1.22 One-Time Inspection

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 (A.2.1.2) program, Fuel Oil Chemistry (A.2.1.20) program, and Lubricating Oil Analysis (A.2.1.27) 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.

The 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 the period of extended operation.

A.2.1.23 Selective Leaching

The Selective Leaching aging management program is a new condition monitoring program that will include one-time inspections of a representative sample of susceptible components to manage loss of material due to selective leaching. Components include piping and fittings, valve bodies, pump casings, heat exchanger components, tanks, and fire hydrants. The materials of construction for these components are gray cast iron, and copper alloy with greater than 15 percent zinc. These components are exposed to raw water, treated water, closed cycle cooling water, waste water, and soil. These one-time inspections for selective leaching will include visual examinations, supplemented by hardness tests or other mechanical techniques as required. If selective leaching is found, the condition will be evaluated to determine the need to expand inspection scope.

The Selective Leaching 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.2.1.24 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 piping full penetration (butt) and partial penetration (socket) welds using volumetric examinations. Inspection of socket welds will be performed by volumetric examination technique demonstrated to be capable of detecting cracking. If such a volumetric 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 LGS 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.

The 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 the period of extended operation.

A.2.1.25 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. Visual inspections are augmented by physical manipulation as necessary to detect hardening and loss of strength of elastomers.

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.

The external surfaces of components that are buried are inspected via the Buried and Underground Piping and Tanks (A.2.1.29) program. The external surfaces of above ground tanks are inspected via the Aboveground Metallic Tanks (A.2.1.19) program.

This new aging management program will be implemented prior to the period of extended operation.

A.2.1.26 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 directs visual inspections of internal surfaces of components be performed when they are made accessible during maintenance activities. The program consists of visual inspections of metallic and elastomeric components such as piping, piping elements and piping components, ducting components, tanks, heat exchangers, elastomers and other components within the scope of license renewal. This program will manage the aging effects of loss of material for metallic and elastomeric components, and hardening and loss of strength for elastomers. The program includes provisions for visual inspections of the internal surfaces of components not managed under other aging management programs, augmented by physical manipulation of flexible elastomers where appropriate.

This new aging management program will be implemented prior to the period of extended operation.

A.2.1.27 Lubricating Oil Analysis

The Lubricating Oil Analysis aging management program is an existing program that provides oil condition monitoring activities to manage the loss of material and the 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 contamination and determine the physical properties of lubricating oil within operating machinery. These activities are used to verify that the wear product and contamination levels and the physical properties of lubricating oil are maintained within acceptable limits to ensure that intended functions are maintained.

A.2.1.28 Monitoring of Neutron-Absorbing Materials Other Than Boraflex

The Monitoring of Neutron-Absorbing Materials Other Than Boraflex program is an existing condition monitoring program that periodically analyzes test coupons of the Boral material in the Unit 1 and Unit 2 spent fuel racks to determine if the neutron-absorbing capability of the material has degraded. This program ensures that a 5 percent sub-criticality margin is maintained in the spent fuel pool.

The Monitoring of Neutron-Absorbing Materials Other Than Boraflex aging management program will be enhanced to:

1. Perform test coupon analysis on a ten-year frequency.

2. Initiate corrective action if coupon test result data indicates that acceptance criteria will be exceeded prior to the next scheduled test coupon analysis.

These enhancements will be implemented prior to the period of extended operation.

A.2.1.29 Buried and Underground Piping and Tanks

The Buried and Underground Piping and Tanks aging management program is an existing program that manages the external surface aging effects of loss of material for piping and components in a buried or underground environment. The LGS buried component activities consist of preventive and condition-monitoring measures to manage, detect and monitor the loss of material due to external corrosion for piping and components with in the scope of license renewal that are in a buried or underground environment.

External inspections of buried components will occur opportunistically when they are excavated for any reason.

The Buried and Underground Piping and Tanks aging management program will be enhanced to:

1. Evaluate adverse indications and potential inspection expansion, as part of the corrective action program, whenever inspections are performed.

2. Coat the underground Emergency Diesel Generator System fuel oil piping prior to the period of extended operation. The coating will be in accordance with Table 1 of NACE SP0169-2007 or Section 3.4 of NACE RP0285-2002.

3. Perform direct visual inspections and volumetric inspections of the underground Emergency Diesel Generator System fuel oil piping and components during each 10-year period beginning 10 years prior to the entry into the period of extended operation. Prior to the period of extended operation all in scope Emergency Diesel Generator System fuel oil piping and components located in underground vaults will undergo a 100 percent visual inspection. Volumetric inspections will also be performed. After entering the period of extended operation, 2 percent of the linear length of in scope Emergency Diesel Generator System fuel oil piping and components located in underground vaults will undergo direct visual inspections and volumetric inspections every 10 years. Inspection locations after entering the period of extended operation will be selected based on susceptibility to degradation and consequences of failure. Visual inspections will be performed by a NACE qualified inspector.

4. Perform two sets of volumetric inspections of the Safety Related Service Water System underground piping and components during each 10-year

period beginning 10 years prior to the entry into the period of extended operation. Each set of volumetric inspections will assess either the entire length of a run of in scope Safety Related Service Water piping and components in the underground vault or a minimum of 10 feet of the linear length of in scope Safety Related Service Water System piping and components in the underground vault. Inspection locations will be selected based on susceptibility to degradation and consequences of failure.

5. Specify that visual inspections of Safety Related Service Water System underground piping and components will be performed by a NACE qualified inspector.

6. Perform trending of the cathodic protection testing results to identify changes in the effectiveness of the system and to ensure that the rectifiers required to protect in scope piping are reliable 90 percent of the time.

7. Modify the yearly cathodic protection survey acceptance criterion to meet NACE SP0169-2007 standards.

These enhancements will be implemented prior to the period of extended operation, with the actions performed in accordance with the schedule described above.

A.2.1.30 ASME Section XI, Subsection IWE

The ASME Section XI, Subsection IWE aging management program is an existing program based on ASME Code and complies with the provisions of 10 CFR 50.55(a). The program consists of periodic inspection of the primary containment liner plate surfaces and components, including its integral attachments, diaphragm slab carbon steel liner, downcomers and bracing, penetration sleeves, pressure retaining bolting, 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.

Examination methods include visual and volumetric testing as required by ASME Section XI, Subsection IWE. 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. Manage the suppression pool liner and coating system to:

    a. Remove any accumulated sludge in the suppression pool every refueling outage.

    b. Perform an ASME IWE examination of the submerged portion of the suppression pool each ISI period.

c. Use the results of the ASME IWE examination to implement a coating maintenance plan to:
   - Perform local recoating of areas with general corrosion that exhibit greater than 25 mils plate thickness loss.
   - Perform spot recoating of pitting greater than 50 mils deep.
   - Recoat plates with greater than 25 percent coating depletion.

   The coating maintenance plan will be initiated in the 2012 refueling outage for Unit 1 and the 2013 refueling outage for Unit 2 and implemented such that the areas exceeding the above criteria are recoated prior to the period of extended operation. The coating maintenance plan will continue through the period of extended operation to ensure the coating protects the liner to avoid significant material loss.

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.

These enhancements will be implemented prior to the period of extended operation.

A.2.1.31 ASME Section XI, Subsection IWL

The ASME Section XI, Subsection IWL aging management program is an existing program based on ASME Code and complies with the provisions of 10 CFR 50.55(a). The program requires periodic inspection of Containment Structure concrete surfaces to identify areas of deterioration and distress such as defined in ACI 201.1 and ACI 349.3R, including cracking, loss of bond, and loss of material.

Inspection methods, inspected parameters, and acceptance criteria are in accordance with ASME Section XI, Subsection IWL as approved by 10 CFR 50.55(a). Observed conditions that have the potential for impacting an intended function are evaluated for acceptability in accordance with ASME Section XI, Subsection IWL requirements or corrected in accordance with the corrective action program.

The ASME Section XI, Subsection IWL aging management program will be enhanced to:

1. Include second tier acceptance criteria of ACI 349.3R.

This enhancement will be implemented prior to the period of extended operation.

A.2.1.32 ASME Section XI, Subsection IWF

The ASME Section XI, Subsection IWF aging management program is an existing program that consists of periodic visual examinations of ASME Class 1, 2, 3, and MC piping and component supports for identification of signs of degradation such as loss of material, loss of mechanical function and loss of pre-load. The program is implemented through corporate and station procedures, which provide inspection and acceptance criteria consistent with the requirements of the ASME Code, Section XI, Subsection IWF as approved in 10 CFR 50.55(a). 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, lubricant and sealants, and installation torque or tension to prevent or mitigate degradation and failure of structural bolting.

These enhancements will be implemented prior to the period of extended operation.

A.2.1.33 10 CFR Part 50, Appendix J

The 10 CFR Part 50, Appendix J aging management program is an existing program that monitors leakage rates through the containment pressure boundary, including penetrations and other access openings, in order to detect age related degradation of the containment pressure boundary. Corrective actions are taken if leakage rates exceed acceptance criteria. The Primary Containment Leakage Rate Testing Program (LRT) provides for aging management of pressure boundary degradation due to aging effects from the loss of material, loss of sealing, loss of leak tightness, or loss of preload in systems penetrating containment. The Appendix J program also detects degradation of gaskets and seals for the primary containment pressure boundary access points. Consistent with the current licensing basis, the containment leak rate tests are performed in accordance with the regulations and guidance provided in 10 CFR 50 Appendix J Option B, Regulatory Guide 1.163, “Performance-Based Containment Leak-Test Program,” NEI 94-01 “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.2.1.34 Masonry Walls

The Masonry Walls program is an existing program implemented as part of the Structures Monitoring (A.2.1.35) 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 aging management program addresses loss of material, and cracking due to age-related degradation of concrete for masonry walls and will inspect for shrinkage or separation, along with gaps between the supports and masonry walls. The program relies on periodic visual inspections 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.2.1.17) program.

The Masonry Walls aging management program will be enhanced to:

1. Add the following structures with masonry walls to the program scope:
    a. Administration Building Warehouse
    b. Fuel Oil Pumphouse
    c. Transformer foundation dike walls.
2. Provide additional guidance for inspection of masonry walls for shrinkage, separation, and for gaps between the supports and walls that could impact the wall's intended function.
3. Require an inspection frequency of not greater than 5 years.
4. Require that personnel performing inspections and evaluations meet the qualifications specified within ACI 349.3R.

These enhancements will be implemented prior to the period of extended operation.

A.2.1.35 Structures Monitoring

The Structures Monitoring program is an existing 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 (A.2.1.34) program. The program relies on periodic visual inspections to monitor the condition of structures and structural components, structural bolting, component supports, and masonry block walls. The inspections are conducted on a frequency not to exceed 5 years.

The Structures Monitoring aging management program will be enhanced to:

1. Add the following structures:
    a. Admin Building Warehouse
    b. Fuel Oil Pumphouse
    c. Service Water Pipe Tunnel
    d. Yard Structures

- Aux Fire Water Storage Tank Foundation
- Backup Fire Pump House and Foundation
- Well Pump #3 Enclosure and Foundation
- Railroad Bridge
- Manholes 001 and 002
- Fuel Oil Storage Tank Dike
- Transformer foundations and dikes

2. 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, and other enclosures

    d. Sliding surfaces

    e. Sump and Pool liners

    f. Electrical cable trays and conduits

    g. Electrical duct banks

    h. Tube tracks

    i. Doors

    j. Penetration seals

    k. Blowout panels

3. Monitor groundwater chemistry on a frequency not to exceed 5 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.

4. 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. Revise storage requirements for high strength bolts to include recommendations of Research Council on Structural Connections (RSCS) Specification for Structural Joints Using High Strength Bolts, Section 2.0.

5. Monitor concrete for areas of abrasion, erosion, and cavitation degradation, drummy areas that can exceed the cover concrete thickness in depth, popouts and voids, scaling, and passive settlements or deflections.

6. Perform inspections on a frequency not to exceed 5 years.

7. Perform inspections of sub-drainage sump pit internal concrete on a 5-year frequency as a leading indicator the condition of below grade concrete exposed to ground water.

8. Require that personnel performing inspections and evaluations meet the qualifications specified within ACI 349.3R.

9. Perform inspection of elastomeric vibration isolation elements and structural seals for cracking, loss of material and hardening. Visual inspections of elastomeric vibration isolation elements are to be supplemented by manipulation to detect hardening when vibration isolation function is suspect.

10. Monitor accessible sliding surfaces to detect significant loss of material due to wear, corrosion, debris, or dirt, that could result in lock-up or reduced movement.

11. Perform opportunistic inspection of below grade portions of in scope structures in the event of excavation which exposes normally inaccessible below grade concrete.

12. Include applicable acceptance criteria from ACI 349.3R.

13. 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.2.1.36 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 program is an existing program which will be enhanced to provide management of aging effects for water-control structures. The program monitors the condition of the Spray Pond and Pumphouse and the Yard Facilities dikes around the Condensate Storage Tanks (CST) storage tanks. The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants aging management 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, loss of bond, loss of material (spalling, scaling) and 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. Require inspection of structural bolting integrity (loss of material and loosening of the bolts).

2. Require monitoring of aging effects for increase of porosity and permeability of concrete structures and loss of material for steel components.

3. Require the proper functioning of dike drainage systems.

4. Require increased inspection frequency if the extent of the degradation is such that the structure or component may not meet its design basis if allowed to continue uncorrected until the next normally scheduled inspection.

5. Require (a) 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, and (b) examination of the exposed portions of the below-grade concrete when excavated for any reason.

6. Monitor raw water chemistry at least once every 5 years for pH, chlorides, and sulfates and verify that it remains non-aggressive, or evaluate results exceeding criteria to assess impact, if any, on submerged concrete.

7. Require visual examinations of the Spray Pond and Pumphouse submerged wetwell concrete for signs of degradation during maintenance activities. If significant concrete degradation is identified, a plant specific aging management program should be implemented to manage the concrete aging during the period of extended operation.

8. Require that active cracks in structural concrete or extent of corrosion in steel are documented and trended, until the condition is no longer occurring or until a corrective action is implemented.

9. Require acceptance and evaluation of structural concrete using quantitative criteria based on Chapter 5 of ACI 349.3R.

10. Provide guidance to ensure proper specification of bolting material, lubricant and sealants, and installation torque or tension to prevent or mitigate degradation and failure of structural bolting. Revise storage requirements for high strength bolts to include recommendations of Research Council on Structural Connections (RSCS) Specification for Structural Joints Using High Strength Bolts, Section 2.0.

These enhancements will be implemented prior to the period of extended operation.

A.2.1.37 Protective Coating Monitoring and Maintenance Program

The Protective Coating Monitoring and Maintenance Program is an existing condition monitoring program that provides for aging management of Service Level I coatings inside the LGS primary containment 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 provides for coating system visual inspection, assessment, 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 at LGS. This program ensures that the Service Level I coatings maintain adhesion so as to not effect 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 Emergency Core Cooling Systems (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.

The Protective Coating Monitoring and Maintenance Program will be enhanced to:

1. Create the position of Nuclear Coatings Specialist qualified to ASTM D 7108 standards.

This enhancement will be implemented 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

The Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements aging management program is a new program that will be used to manage aging 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 indications of reduced insulation resistance, such as embrittlement, discoloration, cracking, melting, swelling, or surface contamination. An adverse localized environment is a condition in a limited plant area that is significantly more severe than the specified service environment for the cable or connection.

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.2.1.39 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 program that will be used to manage aging of non-EQ cable and connection insulation of the in scope portions of the Process Radiation Monitoring and Neutron Monitoring Systems.

The in scope process radiation monitoring and neutron monitoring circuits are sensitive instrumentation circuits with high voltage, low-level current signals and 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.

Calibration testing will be performed for the in scope process radiation monitoring circuits. Direct cable testing will be performed for the in scope neutron monitoring circuits. These calibration and cable tests will be performed and results will be assessed for reduced insulation resistance prior to the period of extended operation and at least once every 10 years during the period of extended operation.

A.2.1.40 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 program that will be used to manage the aging effects and mechanisms of non-EQ, in scope, inaccessible power cables. For this program, power is defined as greater than or equal to 400 V. These cables may at times be exposed to significant moisture. Significant moisture is defined as periodic exposure to moisture that lasts more than a few days (e.g., cable wetting or submergence in water). Periodic exposures that last less than a few days (e.g., normal rain and drain) are not significant. 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 in the scope of this aging management program will be tested using a proven test for detecting deterioration of the insulation system due to wetting, 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 6 years. The first tests will be completed prior to the period of extended operation.

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 inspection results. The frequency of inspection will recognize that the objective of the inspections, as a preventive action, is to minimize potential exposure of in scope cables to significant moisture. 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.

A.2.1.41 Metal Enclosed Bus

The Metal Enclosed Bus aging management program is a new program that will be used to manage aging of in scope metal enclosed bus during the period of extended operation. The internal portions of the bus enclosure assemblies will be inspected for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of water intrusion. The bus insulation will be visually inspected for signs of reduced insulation resistance, such as embrittlement, cracking, chipping, melting, discoloration, swelling or surface contamination. The internal bus insulating supports will be visually inspected for structural integrity and signs of cracks. Enclosure assembly elastomers will be visually inspected for surface cracking, crazing, scuffing, dimensional change, shrinkage, discoloration, hardening, and loss of strength. A sample of accessible bolted connections will be inspected for increased resistance of connection using thermography. The sample will be 20 percent of the accessible metal enclosed bus bolted connection population with a maximum sample size of 25.

The inspections and thermography will be performed at least once every 10 years for indications of aging degradation. This new program will be implemented prior to the period of extended operation. In addition, the first tests and inspections will be completed prior to the period of extended operation.

A.2.1.42 Fuse Holders

The Fuse Holders aging management program is a new program that applies to fuse holders located outside of active devices that have been identified as susceptible to aging effects. Fuse holders located inside an active device are not within the scope of this program. This program will be used to manage aging of the metallic portions of fuse holders. Stressors managed by this aging management program include frequent manipulation, vibration, chemical contamination, corrosion, oxidation, ohmic heating, thermal cycling and electrical transients. Fuse holders subject to increased resistance of connection or fatigue, will be tested, by a proven test methodology, at least once every 10 years for indications of aging degradation. Visual inspection is not part of this program.

The new Fuse Holders program will be implemented prior to the period of extended operation. In addition, the first tests will be completed prior to the period of extended operation.

A.2.1.43 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 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. A representative sample of non-EQ electrical cable connections will be selected for one-time testing considering application (medium and low voltage), circuit loading (high loading) 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 technical basis for the sample selected is to be documented. 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.

The new Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements 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

None. The Limerick Generating Station, Units 1 and 2 License Renewal Application does not include plant-specific aging management programs.

A.3 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 and environmental qualification (EQ) of electric components. These programs are evaluated in this section.

A.3.1.1 Fatigue Monitoring

The Fatigue Monitoring program is an existing program that manages fatigue damage of reactor coolant pressure boundary (RCPB) and other components subject to the reactor coolant, treated water, steam, and air-indoor uncontrolled environments.

The Fatigue Monitoring program is a preventive program that monitors and tracks 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 reviews the temperature and pressure profiles of the actual transients and counts them in the appropriate design transient category. The program compares the cumulative cycles for each design transient to the cycle limits specified in Technical Specification 5.6, UFSAR Table 3.9-2, "Design Events," and Table 5.2-9, “RCPB Operating Thermal Cycles.”

If a 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 increased transient severity such that the cumulative usage factor (CUF) does not exceed the design limit of 1.0, including environmental effects where applicable.

The effect of the reactor coolant environment on RCPB component fatigue life has been determined by performing environmental fatigue analyses for locations selected using NUREG/CR-6260 guidance. Additional environmental fatigue analyses were performed for limiting locations within the RPV and for each RCPB system. Environmentally-adjusted cumulative usage factors (CUFen) were computed in accordance with the requirements specified in NUREG/CR-6909 for each material.

The Fatigue Monitoring aging management program will be enhanced to:

1. Monitor additional plant transients that are significant contributors to fatigue usage and to impose administrative transient cycle limits corresponding to the limiting numbers of cycles used in the environmental fatigue calculations.

This enhancement will be implemented prior to the period of extended operation.

A.3.1.2 Environmental Qualification (EQ) of Electric Components

The Environmental Qualification (EQ) of Electric Components is an existing 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 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.

10 CFR 54.21(c)(2) 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. Only two exemptions were identified that are based upon a TLAA, but neither of these exemptions is required for the period of extended operation. These were associated with Pressure-Temperature (P-T) limits developed using exemptions to 10 CFR 50 Appendix G to permit use of ASME Code Cases N-588 and N-640. Since the current P-T limits are only valid for 32 Effective Full Power Years (EFPY), they must be superseded prior to the period of extended operation. Therefore, the current exemptions will not be required during the period of extended operation.

A.4.2 Reactor Pressure Vessel Neutron Embrittlement Analysis

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 reactor pressure vessel embrittlement calculations for LGS that evaluated 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 of 32 Effective Full Power Years (EFPY). These analyses are considered TLAAs as defined in 10 CFR 54.21(c) and they were evaluated for the increased neutron fluence associated with 60 years of operation as described in the subsections below.

A.4.2.1 Neutron Fluence Projections

High energy (>1 MeV) neutron fluence was calculated 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. This RAMA methodology was used to develop 60-year, 57 EFPY fluence values for LGS. The 57 EFPY fluence projections are used in the evaluations of the neutron embrittlement TLAAs.

The 57 EFPY fluence projections have been determined for reactor vessel beltline materials, which include the reactor vessel plate materials, welds, and forgings that will be exposed to 1.0 E+17 neutrons/cm^2 (n/cm^2) or more during 60 years of operation. Fluence projections have also been determined for specific reactor vessel internals 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

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.

Upper Shelf Energy (USE) values were computed for all LGS beltline materials that will be exposed to over 1.0 E+17 n/cm^2 by the end of the period of extended operation (57 EFPY). The 57 EFPY USE values for the beltline materials were determined using methods consistent with Regulatory Guide 1.99, Revision 2.

The USE values for LGS beltline materials remain within the limits of 10 CFR 50 Appendix G requirements at 57 EFPY, either by having USE values of at least 50 ft-lb or through an equivalent margins analysis (EMA). Therefore, the analyses are projected for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

A.4.2.3 Adjusted Reference Temperature

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 non-irradiated metal (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} ($\Delta\ RT_{NDT}$) is evaluated as the difference in the 30 ft-lb index temperatures from the average Charpy curves measured before and after irradiation. This increase ($\Delta\ RT_{NDT}$) 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} + $\Delta\ RT_{NDT}$ + Margin. The Margin term is defined in Regulatory Guide 1.99, Revision 2.

ART values were computed for LGS beltline materials in accordance with Regulatory Guide 1.99, Revision 2. The ART values of the limiting beltline materials at 57 EFPY for each unit remain below 200 degrees F, which is the RT_{NDT} limit.

The analysis for the adjusted reference temperature has been projected to the end of 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 (P-T) limits, including heatup and cooldown operations. These limits specify the maximum allowable pressure as a function of reactor coolant temperature. As the reactor pressure vessel is exposed to increased neutron irradiation, its fracture toughness is reduced. The P-T limits must account for the anticipated reactor vessel fluence.

The current P-T limits are based upon 32 EFPY fluence projections, consistent with the 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 for P-T limits that are located in the Technical Specifications (TS). 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, which constitute 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 P-T limit curves for the current period of operation.

The LGS P-T limits are included in the Technical Specifications and updated P-T limits will be approved for use prior to 32 EFPY for each unit, which is prior to the period of extended operation. Maintenance of the P-T limits during the period of extended operation will be managed using the applicable process from those described above, in accordance with 10 CFR 54.21(c)(1)(iii).

A.4.2.5 Axial Weld Inspection

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 LGS 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, 57 EFPY fluence values were derived for the limiting axial weld. Using the 57 EFPY fluence values, the LGS Mean RT_{NDT} values were computed 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 LGS units, the fact that the LGS Mean RT_{NDT} values for the period of extended operation are significantly less than the NRC value leads to the conclusion that the Unit 1 and 2 conditional failure probability is bounded by the NRC analysis, consistent with the requirements defined in GL 98-05. This analysis has been projected through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

A.4.2.6 Circumferential Weld Inspection

ASME Section XI governs the inspection of the reactor pressure vessel circumferential welds, as implemented by the LGS In-service Inspection Program. LGS has received inspection relief for circumferential welds for the remainder of the 40-year license period. The circumferential weld failure probability assessment is based on 32 EFPY fluence values associated with 40 years of operation and has been identified as a TLAA requiring evaluation for the period of extended operation.

In order to evaluate the LGS circumferential weld failure probability assessment for 60 years, 57 EFPY fluence values were derived for the limiting circumferential weld. Using the 57 EFPY fluence values, the LGS Mean RT_{NDT} values were computed 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 LGS units, the fact that the LGS Mean RT_{NDT} values for the period of extended operation are significantly less than the NRC value leads to the conclusion that the LGS conditional failure probability is bounded by the NRC analysis, consistent with the requirements defined in GL 98-05.

The effects of aging on the reactor pressure vessel intended functions will be managed in accordance with 10 CFR 54.21(c)(1)(iii) for the period of extended operation by reapplication for circumferential weld examination relief under 10 CFR 50.55a(a)(3). The plant-specific information described above demonstrates that at the end of the renewal period, the circumferential welds meet the limiting conditional failure probability for circumferential welds specified in the FSER of BWRVIP-05. Operator training and procedures will continue to be utilized during the license renewal term to limit cold over-pressure events.

A.4.2.7 Reactor Pressure Vessel Reflood Thermal Shock

A generic fracture mechanics evaluation was performed in 1979 to evaluate the effects of a postulated Loss of Coolant Accident (LOCA) on the structural integrity of a BWR-6 reactor pressure vessel. The LOCA event considered was a rupture of a main steam line, which 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 blowdown and the subsequent injection of cold water produce low temperature and high thermal stresses in the vessel. This analysis concluded that the reactor pressure vessel has a considerable margin to failure by brittle fracture even in the presence of large postulated initial flaws. This generic analysis envelopes LGS 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 using plant-specific reactor pressure vessel data for LGS. The analysis determined that during the period of extended operation for both units, there is sufficient toughness margin to prevent fracture due to reflood thermal shock. An existing flaw in the reactor pressure vessel would not propagate due to brittle fracture during a LOCA.

The reactor pressure vessel reflood thermal shock analysis has been projected for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

A.4.3 Metal Fatigue

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 (TLAAs) requiring evaluation for the period of extended operation in accordance with 10 CFR 54.21(c).

A.4.3.1 ASME Section III, Class 1 Fatigue Analyses

The LGS 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 requirements. Fatigue analyses 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 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 It does not exceed a limit of 1.0.

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 have been identified as time-limited aging analyses.

Each of the Class 1 fatigue analyses was evaluated for 60 years by determining that 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 predicted based upon the average rates of past occurrences. In order to assure that these projections remain valid, the Fatigue Monitoring program will be used to assure the cycle limits are not exceeded during the period of extended operation. The program includes requirements that trigger corrective action if a transient approaches a cycle limit. Corrective action may include reanalysis of affected Class 1 components to address increased numbers of cycles, repair, or replacement of the component.

The effects of aging on the intended functions of components analyzed in accordance with ASME Section III, Class 1 requirements will be adequately managed for the period of extended operation by the Fatigue Monitoring program 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 Calculations

Piping designed in accordance with ASME Section III, Class 2 or 3 design rules 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 cycles anticipated 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.

For the piping and components that are affected by the reactor vessel operational transients, including the Class 2 and 3 piping extending from Class 1 systems, the 60-year cycle projections demonstrate that the total number of thermal and pressure cycles will not exceed 7,000 cycles during the period of extended operation. For the remaining systems that are affected by different thermal and pressure cycles, an operational review was performed that also concluded that the total number of cycles, projected for 60 years, will not exceed 7,000 cycles for these systems. This includes the Fire Protection, Emergency Diesel Generator, and Auxiliary Steam systems. Systems with operating temperatures below specified thresholds were determined to have low numbers of equivalent full temperature cycles since the fluid temperature changes are small. Therefore, since the stress range reduction factor originally selected for the components in all of these systems remain applicable, the TLAAs remain valid for the period of extended operation.

The effects of aging on the intended function(s) of components analyzed in accordance with ASME Section III, Class 1 requirements will be adequately managed for the period of extended operation by the Fatigue Monitoring program in accordance with 10 CFR 54.21(c)(1)(iii).

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 has a reported cumulative usage factor (CUF) in the RPV stress report and for each ASME Class 1 RCPB piping system. These environmental fatigue calculations were performed for the limiting wetted location for each material within the component that contacts reactor coolant.

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 LGS components for environmental effects:

Carbon and Low Alloy Steels

- Those provided in Appendix A of NUREG/CR-6909, using either the applicable ASME Section III fatigue design curve or 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 program in the same manner as all other 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 for the period of extended operation by the LGS Fatigue Monitoring program in accordance with 10 CFR 54.21(c)(1)(iii).

A.4.3.4 Reactor Vessel Internals Fatigue Analyses

Several reactor vessel internal components have been analyzed for fatigue, including the top guide, core support plate, and core shroud. These fatigue analyses have been identified as TLAAs that require evaluation for the period of extended operation.

The fatigue analyses 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. Transient cycle projections were prepared that demonstrate the design transient cycle limits will not be exceeded in 60 years. Therefore, these analyses remain valid through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

A.4.3.5 High-Energy Line Break (HELB) Analyses Based Upon Fatigue

High Energy Line Break (HELB) analyses for LGS 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, these analyses have been identified as TLAAs.

Transient cycle projections were performed that determined the 40-year transient cycle limits will not be exceeded in 60 years. The Class 1 piping fatigue analyses were demonstrated to remain valid for the period of extended operation. Therefore, the HELB break determinations based upon these fatigue analyses will also remain valid for 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 LGS. 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.3.1.2) program will manage the effects of aging effects for the components associated with the environmental qualification TLAA. This program implements the requirements of 10 CFR 50.49 (as further defined and clarified by NUREG-0588, and RG 1.89, Rev. 1). Component aging evaluations are reanalyzed on a routine basis to extend the qualifications of components as part of the LGS 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). The Environmental Qualification (EQ) of Electric Components (A.3.1.2) program methodology is further described in Appendix A, Section A.3.1.2.

Under the LGS 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 Containment Liner and Penetrations Fatigue Analysis

A.4.5.1 Containment Liner and Penetrations Fatigue Analysis

The LGS primary containment liner and penetrations were designed and analyzed for transient cycles predicted to occur in 40 years. The Class 1 flued-head penetrations were also analyzed for fatigue using cycles predicted to occur for 40 years. These analyses have been identified as TLAAs.

Transient cycle projections were performed that determined the 40-year transient cycle limits will not be exceeded in 60 years. This includes startup and shutdown cycles and Design Basis Accident events. An operational review was performed for the MSRV lift cycles that concluded the total number of cycles, projected for 60 years, will not exceed the number analyzed for 40 years. Therefore, the analyses remain valid for the period of extended operation in accordance with 10 CFR 54-21(c)(1)(i).

A.4.6 Other Plant–Specific Time-Limited Aging Analyses

A.4.6.1 Reactor Enclosure Crane Cyclic Loading Analysis

The LGS reactor enclosure crane is designed to meet the fatigue requirements of the Crane Manufacturers Association of America (CMAA) Specification 70 for a Class A, Standby or Infrequent Service Crane, as discussed in UFSAR Section 9.1.5.2, "Reactor Enclosure Crane, Equipment Design." This evaluation of 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.

The reactor enclosure crane was purchased as 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 a minimum of 20,000 cycles.

The evaluation of the reactor enclosure 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 cycles to the minimum allowable design value of 20,000 cycles. The number of cycles projected for 60 years of operation is 3,468 cycles, which is less than 20 percent of the minimum allowable design value. Therefore, the reactor enclosure crane load cycle fatigue analysis remains valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

A.4.6.2 Emergency Diesel Generator Enclosure Cranes Cyclic Loading Analysis

LGS has eight emergency diesel generator enclosure cranes. These cranes were designed to meet or exceed the design fatigue requirements of the Crane Manufacturers Association of America (CMAA) Specification 70 for Class A, Standby or Infrequent Service Cranes. The evaluation of cycles expected over the 40-year life has been identified as a TLAA that requires evaluation for the period of extended operation.

The emergency diesel generator enclosure cranes were evaluated for the period of extended operation by developing 60-year projections for crane load cycles and comparing these projected cycles to the number of cycles evaluated for the design life of the cranes. The emergency diesel generator enclosure cranes were purchased as Class A cranes. They are considered to be cranes experiencing “irregular occasional use followed by long idle periods." For this category of crane, the CMAA design requirements permit a minimum of 20,000 load cycles.

The 60-year load cycle projection includes all load cycles and is based on an estimated 500 load cycles during original construction and 50 load cycles per year during diesel generator maintenance. The 3,500 load cycles are less than 20 percent of the allowable design value of 20,000 cycles. Therefore, the analysis of the emergency diesel generator enclosure cranes remains valid for the period of extended operation.

The analysis remains valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

A.4.6.3 RPV Core Plate Rim Hold-Down Bolt Loss of Preload

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 level 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 LGS for 57 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 75 discrete points along the length of the bolt on the bolt surface nearest the core. These results were integrated and divided by the length of the bolt, resulting in an average fluence value of 3.37 E+19 n/cm^2 along the length of the bolt. This is well below the average fluence of 8.0 E+19 n/cm^2 value previously evaluated. Therefore, the analysis remains valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

A.4.6.4 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 venture-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.

There is no specific analysis of main steam line flow restrictor erosion other than that discussed in UFSAR Section 5.4.4. The UFSAR indicates that very slow erosion occurs with time and such slight enlargement has no safety significance. Since the erosion evaluation could have assumed 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 inch per year, the increase in choked flow rate would be no more than 5 percent after 40 years of operation, and no more than 10 percent after 60 years. The LGS Main Steam Line Break dose calculation determined that the mass of coolant leaving the reactor through the main steam line break is 108,785 lb, but uses 140,000 lb to determine the dose impact from this event. Therefore, sufficient margin exists in the dose calculation to accommodate the postulated erosion of the main steam line flow restrictor through the end of the period of extended operation.

The analysis remains valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

A.4.6.5 Jet Pump Auxiliary Spring Wedge Assembly

Auxiliary spring wedge assemblies have been designed and installed in LGS jet pumps to maintain lateral support for the jet pump inlet mixer. The design analysis considered potential aging effects based upon a design life of 40 years, including fatigue usage and loss of bolt preload due to neutron fluence. These analyses have been identified as TLAAs.

The jet pump auxiliary spring wedge assembly is not an ASME Code component, but it was evaluated using stress and fatigue limits of the ASME Code as guidelines. The cumulative fatigue usage was determined to be 0.77 using the original design basis load cycles from the reactor vessel thermal cycle diagram. The 60-year transient projections for LGS demonstrate that these transient cycle limits will not be exceeded in 60 years of operation. Therefore, the fatigue TLAA remains valid for the period of extended operation.

The auxiliary spring wedge assembly design analysis also evaluated loss of bolt preload due to integrated neutron fluence of 1.4 E+20 n/cm^2 for 40 years. In order to evaluate loss of bolt preload during the period of extended operation, the maximum service life was first determined. The first Unit 1 wedge assembly installed will have a service life of 41 years by the end of the period of extended operation, and the first Unit 2 wedge assembly will have a service life of 45 years.

The RAMA fluence projections were used to determine how long the auxiliary spring wedge assemblies could remain in service before the analyzed fluence value of 1.4 E+20 n/cm^2 would be reached. The fluence projections for the jet pump riser brace location were used since they are bounding for all jet pump locations. The evaluation determined that the auxiliary spring wedge assemblies could be in service for 50 years before they will experience 1.4 E+20 n/cm^2. Therefore, the loss of preload TLAA also remains valid for the period of extended operation in accordance with 10CFR 54.21(c)(1)(i).

A.4.6.6 Jet Pump Restrainer Bracket Pad Repair Clamps

Visual inspections at LGS have found wear at the inlet-mixer wedge/restrainer bracket pad interface on several jet pumps. A repair clamp has been designed and installed that replaces the support function of the restrainer bracket pad. The repair clamp design analysis evaluated end-of-life preload relaxation for 40 years based upon a 5 percent decrease due to thermal and radiation effects. This analysis was identified as a TLAA.

The TLAA was evaluated by assuming a further 5 percent decrease in preload during the period of extended operation. The evaluation determined that adequate clamping force will be maintained with this further reduction of preload through the period of extended operation. The analysis has been projected to the end of the period of extended operation in accordance with 10CFR54.21(c)(1)(ii).

A.4.6.7 Refueling Bellows and Supports Cyclic Loading Analysis

The refueling bellows and supports were analyzed for cycles predicted to occur in 40 years. 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 occurrence to-date. The analyses remain valid for the period of extended operation in accordance with 10 CFR 54-21(c)(1)(i).

A.4.6.8 Downcomers and MSRV Discharge Piping Fatigue Analyses

The MSRV downcomers and bracing inside the suppression chamber, the MSRV discharge piping, and the main steam piping have been evaluated for transient cycles predicted to occur in 40 years. Therefore, these fatigue analyses have been identified as TLAAs.

A minimum of 7,700 MSRV cycles were considered to account for the pool dynamic loads, based on 1,100 actuations of all MSRVs times seven stress cycles per actuation. For the most frequently actuated MSRVs, the analysis was based on 4,700 actuations times three stress cycles per actuation (14,100 total cycles). The quenchers were analyzed for 7,000 SRV opening and closing cycles and 1,000,000 irregular condensation load cycles. An operational review was performed for the MSRV lift cycles that concluded the total number of cycles, projected for 60 years, will not exceed the number analyzed for 40 years. Therefore, the fatigue analyses for the downcomers and MSRV discharge piping will remain valid for the period of extended operation in accordance with 10CFR54.21(c)(1)(i).

A.4.6.9 Jet Pump Slip Joint Repair Clamps

Jet pump slip joint repair clamps have been designed and installed at LGS to minimize vibration and wear of the jet pump assemblies. The structural evaluation determined the loss of preload that would result from neutron fluence during the design life of the clamps. This analysis was identified as a TLAA. The jet pumps and repair hardware are required to be periodically inspected by the Reactor Vessel Internals program. Therefore, this TLAA will be managed in accordance with 10 CFR 54.21(c)(1)(iii).

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	BWR Control Rod Drive Return Line Nozzle is an existing program that will be enhanced to: 1. Specify an extended volumetric inspection of the nozzle-to-cap weld to assure that the inspection includes base metal to a distance of one pipe wall thickness or 0.5 inches, whichever is greater, on both sides of the weld.	Program to be enhanced prior to the period of extended operation.	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 Cast Austenitic Stainless Steel (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 Cast Austenitic Stainless Steel (CASS) to loss of fracture toughness due to neutron	Program to be enhanced prior to the period of extended operation. The initial inspections will be performed either prior to or within 5 years after entering the period of extended operation.	Section A.2.1.9

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
		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.		
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 components. 2. Prohibit the use of lubricants containing molybdenum disulfide for closure bolting for pressure retaining components. 3. Minimize the use of high strength bolting (actual measured yield strength equal to or greater than 150 ksi) for closure bolting for pressure retaining components. High strength bolting, if used, will be monitored for cracking.	Program to be enhanced prior to the period of extended operation.	Section A.2.1.11
12	Open-Cycle Cooling Water System	Open-Cycle Cooling Water System is an existing program that will be enhanced to: 1. Perform internal inspection of buried Safety Related Service Water Piping when it is accessible during maintenance and repair activities. 2. Perform periodic inspections for loss of material in the Nonsafety-Related Service Water System at a frequency in accordance with NRC Generic Letter 89-13.	Program to be enhanced prior to the period of extended operation.	Section A.2.1.12
13	Closed Treated Water Systems	Closed Treated Water Systems is an existing program that will be enhanced to: 1. Perform condition monitoring and performance monitoring, including periodic testing and opportunistic and periodic NDE, to	Program to be enhanced prior to the period of extended operation. Inspection schedule identified	Section A.2.1.13

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
		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 and inspected at an interval not to exceed once in 10 years during the period of extended operation.	in commitment.	
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. Perform annual periodic inspections as defined in the appropriate ASME B30 series standard for all cranes, hoists, and equipment handling systems within the scope of license renewal. For handling systems that are infrequently in service, such as those only used during refueling outages, annual periodic inspections may be deferred until just prior to use. 2. Perform inspections 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. 3. Evaluate loss of material due to wear or corrosion and any loss of bolting preload on cranes, hoists, and equipment handling systems per the appropriate ASME B30 series standard. 4. Perform repairs to cranes, hoists, and equipment handling systems per the appropriate ASME B30 series standard.	Program to be enhanced prior to the period of extended operation.	Section A.2.1.14
15	Compressed Air Monitoring	Existing program is credited.	Ongoing	Section A.2.1.15
16	BWR Reactor Water Cleanup System	Existing program is credited.	Ongoing	Section A.2.1.16
17	Fire Protection	Fire Protection is an existing program that will be enhanced to: 1. Provide additional inspection guidance to identify degradation of fire barrier walls, ceilings, and floors for aging effects such as cracking, spalling and loss of material. 2. Provide additional inspection guidance for identification of	Program to be enhanced prior to the period of extended operation.	Section A.2.1.17

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
		excessive loss of material due to corrosion on the external surfaces of the halon and carbon dioxide systems.		
18	Fire Water System	Fire Water System is an existing program that will be enhanced to: 1. Replace sprinkler heads or perform 50-year sprinkler head testing using the guidance of NFPA 25 "Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems" (2002 Edition), Section 5.3.1.1.1. This testing will be performed prior to the 50-year in-service date and every 10 years thereafter. 2. Inspect selected portions of the water based fire protection system piping located aboveground and exposed to the fire water internal environment by non-intrusive volumetric examinations. These inspections shall be performed prior to the period of extended operation and will be performed every 10 years thereafter.	Program to be enhanced prior to the period of extended operation. Inspection schedule identified in commitment.	Section A.2.1.18
19	Aboveground Metallic Tanks	Aboveground Metallic Tanks is an existing program that will be enhanced to: 1. Include UT measurements of the bottom of the Backup Water Storage Tank. Tank bottom UT inspections will be performed whenever the tank is drained during the period of extended operation and within five years prior to entering the period of extended operation. 2. Provide visual inspections of the Backup Water Storage Tank external surfaces and include, on a sampling basis, removal of insulation to permit inspection of the tank surface. The tank external surface visual inspection will be conducted on a two year frequency.	Program to be enhanced prior to the period of extended operation. Inspection schedule identified in commitment.	Section A.2.1.19
20	Fuel Oil Chemistry	Fuel Oil Chemistry is an existing program that will be enhanced to: 1. Periodically drain water from the Fire Pump Engine Diesel Oil Day Tank and the Fire Pump Diesel Engine Fuel Tank.	Program to be enhanced prior to the period of extended operation. Inspection schedule identified	Section A.2.1.20

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
		2. Perform internal inspections of the Fire Pump Engine Diesel Oil Day Tank, the Fire Pump Diesel Engine Fuel Tank, and the Diesel Generator Day Tanks, 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, cleaned and the internal surfaces either volumetrically or visually inspected. If evidence of degradation is observed during visual inspections, the diesel fuel tanks will require follow-up volumetric inspection. 3. Perform periodic analysis for total particulate concentration and microbiological organisms for the Fire Pump Engine Diesel Oil Day Tank and the Fire Pump Diesel Engine Fuel Tank. 4. Perform periodic analysis for water and sediment and microbiological organisms for the Diesel Generator Diesel Oil Storage Tanks. 5. Perform periodic analysis for water and sediment content, total particulate concentration, and the levels of microbiological organisms for the Diesel Generator Day Tanks. 6. Perform analysis of new fuel oil for water and sediment content, total particulate concentration and the levels of microbiological organisms for the Fire Pump Engine Diesel Oil Day Tank and the Fire Pump Diesel Engine Fuel Tank. 7. Perform analysis of new fuel oil for total particulate concentration and the levels of microbiological organisms for the Diesel Generator Diesel Oil Storage Tanks.	in commitment.	
21	Reactor Vessel Surveillance	Existing program is credited.	Ongoing	Section A.2.1.21
22	One-Time Inspection	One-Time Inspection is a new program that will be used to verify the system-wide effectiveness of the Water Chemistry, Fuel Oil Chemistry and Lubricating Oil Analysis programs.	Program to be implemented prior to the period of extended operation. One-time inspections will be performed within the 10 years	Section A.2.1.22

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
			prior to the period of extended operation.	
23	Selective Leaching	Selective Leaching is a new 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.2.1.23
24	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 program that will manage the aging effect of cracking in stainless steel and carbon steel 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.2.1.24
25	External Surfaces Monitoring of Mechanical Components	External Surfaces Monitoring of Mechanical Components is a new program that manages aging effects of metallic and elastomeric materials through periodic visual inspection of external surfaces for evidence of loss of material. Visual inspections are augmented by physical manipulation as necessary to detect hardening and loss of strength of elastomers.	Program to be implemented prior to the period of extended operation.	Section A.2.1.25
26	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	Internal Surfaces in Miscellaneous Piping and Ducting Components is a new program that manages aging effects of metallic and elastomeric materials through visual inspections of internal surfaces for evidence of loss of material. Visual inspections are augmented by physical manipulation as necessary to detect hardening and loss of strength of elastomers.	Program to be implemented prior to the period of extended operation.	Section A.2.1.26
27	Lubricating Oil Analysis	Existing program is credited.	Ongoing	Section A.2.1.27
28	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:	Program to be enhanced prior to the period of extended operation.	Section A.2.1.28

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
		1. Perform test coupon analysis on a ten-year frequency. 2. Initiate corrective action if coupon test result data indicates that acceptance criteria will be exceeded prior to the next scheduled test coupon analysis.	Inspection schedule identified in commitment.	
29	Buried and Underground Piping and Tanks	Buried and Underground Piping and Tanks is an existing program that will be enhanced to: 1. Evaluate adverse indications and potential inspection expansion, as part of the corrective action program, whenever inspections are performed. 2. Coat the underground Emergency Diesel Generator System fuel oil piping prior to the period of extended operation. The coating will be in accordance with Table 1 of NACE SP0169-2007 or Section 3.4 of NACE RP0285-2002. 3. Perform direct visual inspections and volumetric inspections of the underground Emergency Diesel Generator System fuel oil piping and components during each 10-year period beginning 10 years prior to the entry into the period of extended operation. Prior to the period of extended operation all in scope Emergency Diesel Generator System fuel oil piping and components located in underground vaults will undergo a 100 percent visual inspection. Volumetric inspections will also be performed. After entering the period of extended operation, 2 percent of the linear length of in scope Emergency Diesel Generator System fuel oil piping and components located in underground vaults will undergo direct visual inspections and volumetric inspections every 10 years. Inspection locations after entering the period of extended operation will be selected based on susceptibility to degradation and consequences of failure. Visual inspections will be performed by a NACE qualified inspector. 4. Perform two sets of volumetric inspections of the Safety Related Service Water System underground piping and components	Program to be enhanced prior to the period of extended operation. Inspection schedule identified in commitment.	Section A.2.1.29

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
		during each 10-year period beginning 10 years prior to the entry into the period of extended operation. Each set of volumetric inspections will assess either the entire length of a run of in scope Safety Related Service Water System piping and components in the underground vault or a minimum of 10 feet of the linear length of in scope Safety Related Service Water System piping and components in the underground vault. Inspection locations will be selected based on susceptibility to degradation and consequences of failure. 5. Specify that visual inspections of Safety Related Service Water System underground piping and components will be performed by a NACE qualified inspector. 6. Perform trending of the cathodic protection testing results to identify changes in the effectiveness of the system and to ensure that the rectifiers required to protect in scope piping are reliable 90 percent of the time. 7. Modify the yearly cathodic protection survey acceptance criterion to meet NACE SP0169-2007 standards.		
30	ASME Section XI, Subsection IWE	ASME Section XI, Subsection IWE is an existing program that will be enhanced to: 1. Manage the suppression pool liner and coating system to: a. Remove any accumulated sludge in the suppression pool every refueling outage. b. Perform an ASME IWE examination of the submerged portion of the suppression pool each ISI period. c. Use the results of the ASME IWE examination to implement a coating maintenance plan to: • Perform local recoating of areas with general corrosion that exhibit greater than 25 mils plate thickness loss. • Perform spot recoating of pitting greater than 50 mils deep. • Recoat plates with greater than 25 percent coating depletion.	Program to be enhanced prior to the period of extended operation. Inspection schedule identified in commitment.	Section A.2.1.30

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
		The coating maintenance plan will be initiated in the 2012 refueling outage for Unit 1 and the 2013 refueling outage for Unit 2 and implemented such that the areas exceeding the above criteria are recoated prior to the period of extended operation. The coating maintenance plan will continue through the period of extended operation to ensure the coating protects the liner to avoid significant material loss. 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.		
31	ASME Section XI, Subsection IWL	ASME Section XI, Subsection IWL is an existing program that will be enhanced to: 1. Include second tier acceptance criteria of ACI 349.3R.	Program to be enhanced prior to the period of extended operation.	Section A.2.1.31
32	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, lubricant and sealants, and installation torque or tension to prevent or mitigate degradation and failure of structural bolting.	Program to be enhanced prior to the period of extended operation.	Section A.2.1.32
33	10 CFR Part 50, Appendix J	Existing program is credited.	Ongoing	Section A.2.1.33
34	Masonry Walls	Masonry Walls is an existing program that will be enhanced to: 1. Add the following structures with masonry walls to the program scope: a. Administration Building Warehouse b. Fuel Oil Pumphouse c. Transformer foundation dike walls 2. Provide additional guidance for inspection of masonry walls for shrinkage, separation, and for gaps between the supports and walls that could impact the wall's intended function. 3. Require an inspection frequency of not greater than 5 years.	Program to be enhanced prior to the period of extended operation. Inspection schedule identified in commitment.	Section A.2.1.34

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
		4. Require that personnel performing inspections and evaluations meet the qualifications specified within ACI 349.3R.		
35	Structures Monitoring	Structures Monitoring is an existing program that will be enhanced to: 1. Add the following structures: a. Admin Building Warehouse b. Fuel Oil Pumphouse c. Service Water Pipe Tunnel d. Yard Structures • Aux Fire Water Storage Tank Foundation • Backup Fire Pump House and Foundation • Well Pump #3 Enclosure and Foundation • Railroad Bridge • Manholes 001 and 002 • Fuel Oil Storage Tank Dike • Transformer foundations and dikes 2. 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, and other enclosures d. Sliding surfaces e. Sump and Pool liners f. Electrical cable trays and conduits g. Electrical duct banks h. Tube tracks i. Doors j. Penetration seals k. Blowout panels 3. Monitor groundwater chemistry on a frequency not to exceed 5 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 to be enhanced prior to the period of extended operation. Inspection schedule identified in commitment.	Section A.2.1.35

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
		4. 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. Revise storage requirements for high strength bolts to include recommendations of Research Council on Structural Connections (RSCS) Specification for Structural Joints Using High Strength Bolts, Section 2.0. 5. Monitor concrete for areas of abrasion, erosion, and cavitation degradation, drummy areas that can exceed the cover concrete thickness in depth, popouts and voids, scaling, and passive settlements or deflections. 6. Perform inspections on a frequency not to exceed 5 years. 7. Perform inspections of sub-drainage sump pit internal concrete on a 5-year frequency as a leading indicator the condition of below grade concrete exposed to ground water. 8. Require that personnel performing inspections and evaluations meet the qualifications specified within ACI 349.3R. 9. Perform inspection of elastomeric vibration isolation elements and structural seals for cracking, loss of material and hardening. Visual inspections of elastomeric vibration isolation elements are to be supplemented by manipulation to detect hardening when vibration isolation function is suspect. 10. Monitor accessible sliding surfaces to detect significant loss of material due to wear, corrosion, debris, or dirt, that could result in lock-up or reduced movement. 11. Perform opportunistic inspection of below grade portions of in-scope structures in the event of excavation which exposes normally inaccessible below grade concrete. 12. Include applicable acceptance criteria from ACI 349.3R. 13. Clarify that loose bolts and nuts and cracked high strength bolts		

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
		are not acceptable unless accepted by engineering evaluations.		
36	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. Require inspection of structural bolting integrity (loss of material and loosening of the bolts). 2. Require monitoring of aging effects for increase of porosity and permeability of concrete structures and loss of material for steel components. 3. Require the proper functioning of dike drainage systems. 4. Require increased inspection frequency if the extent of the degradation is such that the structure or component may not meet its design basis if allowed to continue uncorrected until the next normally scheduled inspection. 5. Require (a) 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, and (b) examination of the exposed portions of the below-grade concrete when excavated for any reason. 6. Monitor raw water chemistry at least once every 5 years for pH, chlorides, and sulfates and verify that it remains non-aggressive, or evaluate results exceeding criteria to assess impact, if any, on submerged concrete. 7. Require visual examinations of the Spray Pond and Pumphouse submerged wetwell concrete for signs of degradation during maintenance activities. If significant concrete degradation is identified, a plant specific aging management program should be implemented to manage the concrete aging during the period of extended operation. 8. Require that active cracks in structural concrete or extent of corrosion in steel are documented and trended, until the	Program to be enhanced prior to the period of extended operation. Inspection schedule identified in commitment.	Section A.2.1.36

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
		condition is no longer occurring or until a corrective action is implemented. 9. Require acceptance and evaluation of structural concrete using quantitative criteria based on Chapter 5 of ACI 349.3R. 10. 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. Revise storage requirements for high strength bolts to include recommendations of Research Council on Structural Connections (RSCS) Specification for Structural Joints Using High Strength Bolts, Section 2.0.		
37	Protective Coating Monitoring and Maintenance Program	Protective Coating Monitoring and Maintenance Program is an existing program that will be enhanced to: 1. Create the position of Nuclear Coatings Specialist qualified to ASTM D 7108 standards.	Program to be enhanced prior to the period of extended operation.	Section A.2.1.37
38	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 aging 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.2.1.38
39	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 aging of non-EQ cable and connection insulation of the in scope portions of the Process Radiation Monitoring and Neutron 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 and at least once every 10 years during the	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.2.1.39

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
		period of extended operation.		
40	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 is a new program that will be used to manage the aging effects and mechanisms of non-EQ, in scope, inaccessible power cables. Cables will be tested using a proven test for detecting deterioration of the insulation system. The cables will be tested at least once every 6 years. 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 inspection results. The frequency of inspection will recognize that the objective of the inspections, as a preventive action, is to minimize potential exposure of in scope cables to significant moisture. 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.	Program and initial tests and inspections to be implemented prior to the period of extended operation. Test and Inspection schedule identified in commitment.	Section A.2.1.40
41	Metal Enclosed Bus	Metal Enclosed Bus is a new program that will be used to manage aging of in scope metal enclosed bus. The internal portions of bus enclosure assemblies, bus insulation, bus insulating supports and elastomers will be visually inspected. A sample (20 percent with a maximum sample size of 25) of the accessible metal enclosed bus bolted connection population will be tested using thermography. The inspections and thermography will be performed at least once every 10 years for indications of aging degradation.	Program and initial tests and inspections to be implemented prior to the period of extended operation. Test and inspection schedule identified in commitment.	Section A.2.1.41
42	Fuse Holders	Fuse Holders aging management program is a new program that applies to fuse holders located outside of active devices that have been identified as susceptible to aging effects. Fuse holders subject to increased resistance of connection or fatigue, will be tested, by a proven test methodology, at least once every 10	Program and initial tests to be implemented prior to the period of extended operation. Test schedule identified in commitment.	Section A.2.1.42

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
		years for indications of aging degradation. Visual inspection is not part of this program.		
43	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 aging of metallic cable connections 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.2.1.43
44	Fatigue Monitoring	Fatigue Monitoring is an existing program that will be enhanced to: 1. Monitor additional plant transients that are significant contributors to fatigue usage and to impose administrative transient cycle limits corresponding to the limiting numbers of cycles used in the environmental fatigue calculations.	Program to be enhanced prior to the period of extended operation.	Section A.3.1.1
45	Environmental Qualification (EQ) of Electric Components	Existing program is credited.	Ongoing	Section A.3.1.2
46	Operating Experience	Perform a review of plant-specific and industry operating experience to confirm the effectiveness of the aging management programs	During the first 10 years of entering the period of extended operation	Section B.1.4

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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 (4) types of AMPs:

- Prevention programs preclude aging effects from occurring.
- Mitigation programs slow the effects of aging.
- Condition monitoring programs inspect or 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 ten (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 consistent with the assumptions made in NUREG-1801. The 10-element detail is only provided when the program is plant specific. There are no plant specific aging management programs for LGS.

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 to be consistent with NUREG-1801.

B.1.2 Method of Discussion

For those AMPs that are consistent with the assumptions made in Sections X and XI of NUREG-1801, or are consistent with 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.

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 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 Issue Report (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 follow-up 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 provides for 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 is used at LGS to enhance plant programs, prevent repeat events, and prevent events that have occurred at other plants from occurring at LGS. Limerick, as part of the Exelon fleet, receives Operating Experience (internal and external to Exelon Nuclear) daily. The Operating Experience process (OPEX) screens, evaluates, and acts on operating experience documents and information to prevent or mitigate the consequences of similar events. The OPEX process reviews operating experience from external (also referred to as industry operating experience) and internal (referred to as in-house operating experience) sources. External operating experience may include such things as INPO documents (e.g., SOERs, SERs, SENs, etc.), NRC documents (e.g., GLs, LERs, INs, etc.), and other documents (e.g., 10 CFR Part 21 Reports, etc.). Internal operating experience may include event investigations, trending reports, and lessons learned from in-house events as captured in program notebooks, self-assessments, and in the 10 CFR Part 50, Appendix B corrective action 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 in-house operating experience captured by the Corrective Action Program, Program Self-Assessments, Program Health Reports, and through the review of industry operating experience. Additionally, operating experience was obtained through interviews with system engineers, program engineers, and other plant personnel. New programs utilized plant and or industry operating experience as applicable, and discussed 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.

During the first 10 years of entering the period of extended operation, the AMP owners of programs credited for license renewal will perform a review of plant-specific and industry operating experience to confirm the effectiveness of the aging management programs. This review will determine if the AMP is currently effective, requires modification or identify a need to develop a new AMP. Follow-up actions will be taken as appropriate to provide additional assurance that aging of SSCs in the scope of license renewal will be adequately managed throughout the period of extended operation.

B.1.5 NUREG-1801 Chapter XI Aging Management Programs

The following NUREG-1801 Chapter XI AMPs are described in Section B.2 of this appendix as indicated. Programs are identified as either existing or new. All programs are fully consistent with programs discussed in NUREG-1801.

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 – Requires Enhancement]
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]
16. BWR Reactor Water Cleanup System (Section B.2.1.16) [Existing]
17. Fire Protection (Section B.2.1.17) [Existing – Requires Enhancement]
18. Fire Water System (Section B.2.1.18) [Existing – Requires Enhancement]
19. Aboveground Metallic Tanks (Section B.2.1.19) [Existing – Requires Enhancement]
20. Fuel Oil Chemistry (Section B.2.1.20) [Existing– Requires Enhancement]
21. Reactor Vessel Surveillance (Section B.2.1.21) [Existing]
22. One-Time Inspection (Section B.2.1.22) [New]

23. Selective Leaching (Section B.2.1.23) [New]
24. One-Time Inspection of ASME Code Class 1 Small-Bore Piping (Section B.2.1.24) [New]
25. External Surfaces Monitoring of Mechanical Components (Section B.2.1.25) [New]
26. Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (Section B.2.1.26) [New]
27. Lubricating Oil Analysis (Section B.2.1.27) [Existing]
28. Monitoring of Neutron-Absorbing Materials Other than Boraflex (Section B.2.1.28) [Existing – Requires Enhancement]
29. Buried and Underground Piping and Tanks (Section B.2.1.29) [Existing – Requires Enhancement]
30. ASME Section XI, Subsection IWE (Section B.2.1.30) [Existing – Requires Enhancement]
31. ASME Section XI, Subsection IWL (Section B.2.1.31) [Existing – Requires Enhancement]
32. ASME Section XI, Subsection IWF (Section B.2.1.32) [Existing – Requires Enhancement]
33. 10 CFR Part 50, Appendix J (Section B.2.1.33) [Existing]
34. Masonry Walls (Section B.2.1.34) [Existing – Requires Enhancement]
35. Structures Monitoring (Section B.2.1.35) [Existing – Requires Enhancement]
36. RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (Section B.2.1.36) [Existing – Requires Enhancement]
37. Protective Coating Monitoring and Maintenance Program (Section B.2.1.37) [Existing – Requires Enhancement]
38. Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (Section B.2.1.38) [New]
39. Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits (Section B.2.1.39) [New]
40. Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (Section B.2.1.40) [New]

41. Metal Enclosed Bus (Section B.2.1.41) [New]

42. Fuse Holders (Section B.2.1.42) [New]

43. Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (Section B.2.1.43) [New]

B.1.6 NUREG-1801 Chapter X Aging Management Programs

The following NUREG-1801 Chapter X AMPs are described in Section B.3 of this appendix as indicated. Programs are identified as either existing or new.

1. Fatigue Monitoring (Section B.3.1.1) [Existing – Requires Enhancement]

2. Environmental Qualification (EQ) of Electric Components (Section B.3.1.2) [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 LGS Aging Management Programs (AMPs) is shown below. Links to the sections describing the LGS NUREG-1801 programs are provided.

NUREG-1801 NUMBER	NUREG-1801 PROGRAM	LGS 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)

NUREG-1801 NUMBER	NUREG-1801 PROGRAM	LGS PROGRAM
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 (LGS 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 (PWRs only)	Not Applicable (LGS Units 1 and 2 are BWRs)
XI.M12	Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)	This program is not used or credited. LGS 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.
XI.M16A	PWR Vessel Internals	Not Applicable (LGS 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 (LGS 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 used or credited for aging management. Boraflex material is not used in the LGS 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	BWR Reactor Water Cleanup System (B.2.1.16)
XI.M26	Fire Protection	Fire Protection (Section B.2.1.17)
XI.M27	Fire Water System	Fire Water System (Section B.2.1.18)
XI.M29	Aboveground Metallic Tanks	Aboveground Metallic Tanks (Section B.2.1.19)
XI.M30	Fuel Oil Chemistry	Fuel Oil Chemistry (Section B.2.1.20)
XI.M31	Reactor Vessel Surveillance	Reactor Vessel Surveillance (Section B.2.1.21)
XI.M32	One-Time Inspection	One-Time Inspection (Section B.2.1.22)

NUREG-1801 NUMBER	NUREG-1801 PROGRAM	LGS PROGRAM
XI.M33	Selective Leaching	Selective Leaching (Section B.2.1.23)
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.2.1.24)
XI.M36	External Surfaces Monitoring of Mechanical Components	External Surfaces Monitoring of Mechanical Components (Section B.2.1.25)
XI.M37	Flux Thimble Tube Inspection	Not Applicable (LGS 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.2.1.26)
XI.M39	Lubricating Oil Analysis	Lubricating Oil Analysis (Section B.2.1.27)
XI.M40	Monitoring of Neutron-Absorbing Materials Other than Boraflex	Monitoring of Neutron-Absorbing Materials Other than Boraflex (Section B.2.1.28)
XI.M41	Buried and Underground Piping and Tanks	Buried and Underground Piping and Tanks (Section B.2.1.29)
XI.S1	ASME Section XI, Subsection IWE	ASME Section XI, Subsection IWE (Section B.2.1.30)
XI.S2	ASME Section XI, Subsection IWL	ASME Section XI, Subsection IWL (Section B.2.1.31)
XI.S3	ASME Section XI, Subsection IWF	ASME Section XI, Subsection IWF (Section B.2.1.32)
XI.S4	10 CFR Part 50, Appendix J	10 CFR Part 50, Appendix J (Section B.2.1.33)
XI.S5	Masonry Walls	Masonry Walls (Section B.2.1.34)
XI.S6	Structures Monitoring	Structures Monitoring (Section B.2.1.35)
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.2.1.36)
XI.S8	Protective Coating Monitoring and Maintenance Program	Protective Coating Monitoring and Maintenance Program (Section B.2.1.37)
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.2.1.38)
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.2.1.39)

NUREG-1801 NUMBER	NUREG-1801 PROGRAM	LGS PROGRAM
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.2.1.40)
XI.E4	Metal Enclosed Bus	Metal Enclosed Bus (Section B.2.1.41)
XI.E5	Fuse Holders	Fuse Holders (Section B.2.1.42)
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.2.1.43)
X.M1	Fatigue Monitoring	Fatigue Monitoring (Section B.3.1.1)
X.S1	Concrete Containment Tendon Prestress	Not Applicable (LGS Units 1 and 2 are BWRs with a steel lined concrete containment)
X.E1	Environmental Qualification (EQ) of Electric Components	Environmental Qualification (EQ) of Electric Components (Section B.3.1.2)

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 existing ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD aging management program manages the aging effects of cracking and loss of fracture toughness in Class 1, 2, and 3 piping and components exposed to reactor coolant and treated water environments. This condition monitoring program includes periodic visual, surface, and volumetric examination and leakage testing of Class 1, 2, and 3 pressure-retaining components and their integral attachments. 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. Inspection 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.

In accordance with 10 CFR 50.55a(g)(4)(ii), 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 twelve 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 aging management 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)
- BWR Reactor Water Cleanup System (B.2.1.16)
- One-Time Inspection of ASME Code Class 1 Small-Bore Piping (B.2.1.24)

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 continue to be effective in assuring that intended functions are maintained consistent with the current licensing basis during 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. During the Unit 1 refueling outage in 1989, a volumetric ultrasonic test (UT) identified an indication in a reactor recirculation nozzle to safe end weld. Mechanical Stress Improvement Process (MSIP) was performed on the weld in 1992. The weld was re-examined following the MSIP in 1992 and during four subsequent refueling outages. None of these examinations indicated growth in the indication. The last examination, performed in 2010, also did not indicate any growth. Examination of this weld will continue per BWRVIP-75-A guidance for Category E welds. This is the only crack in reactor coolant pressure boundary piping at LGS Units 1 and 2 suspected to be caused by IGSCC.

This example illustrates how implementation of industry operating experience from NRC GL 88-01 and volumetric ultrasonic testing performed per the ISI program were applied to identify an indication in a susceptible reactor coolant pressure boundary weld. This example demonstrates use of industry recommendations to apply MSIP on a weld with an indication as an effective mitigating action to reduce the stresses in the weld and the probability for continued stress corrosion cracking. This example demonstrates how the industry guidelines per NRC GL 88-01, NUREG-0313, Revision 2 and BWRVIP-75-A are effectively applied to appropriately schedule and perform examinations to verify the condition of the weld is acceptable for continued service. This example also demonstrates that LGS has had good performance relative to cracking in reactor coolant pressure boundary piping caused by IGSCC.

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 IGSCC. This industry experience is documented in NRC Generic Letter 94-03 and Information Notices 94-42 and 97-17. LGS core shrouds are fabricated from Type 304L SS.

   In response to the industry experience cited in GL 94-03, IN 94-42, and IN 97-17, baseline core shroud examinations were performed at LGS in accordance with BWRVIP-07 requirements on Unit 1 in 1996, and on Unit 2 in 1999. Routine examinations are continuing at the frequency, and using the methods required by BWRVIP reports, based on historical examination results.

   Cracking has been identified in core shroud welds on both Units 1 and 2. Expanded scope examinations and structural evaluations have been performed per BWRVIP guidelines each time new indications were identified.

   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 by qualified personnel, are capable of detecting flaws in reactor vessel internal components. 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. The original equipment manufacturer, General Electric, issued guidance for this issue in SIL 462. LGS Units 1 and 2 AHCs are classified as a Group 6 design, which is less susceptible to IGSCC than other designs. Examinations were performed on Unit 1 in 1998 using VT-3 examination methods per the recommendations in GE SIL 462. Examinations were performed in 2004 using EVT-1 methods, and in 2008 using VT-1 methods. Examinations were performed on Unit 2 in 1999 and 2003 using EVT-1 methods, and in 2007 using VT-1 methods. No indications have been identified on any of the LGS AHCs. Future examinations of the AHCs will be in accordance with BWRVIP-180, which requires the use of EVT-1 or ultrasonic test (UT) methods for Group 6 AHC design.

   This example provides objective evidence that the ISI program implements examinations using the methods and evaluation frequency recommended in the appropriate industry guidelines, and that LGS has not experienced cracking in shroud support plate access hole covers.

4. Cracking in core spray internal piping has occurred in some BWRs as discussed in NRC Bulletin 80-13 and BWRVIP-18-A. Baseline examinations of the core spray sparger and associated welds were performed in accordance with BWRVIP recommendations on Unit 1 in 1998 and on Unit 2 in 1999. No indications were detected. The core spray spargers are currently examined in accordance with BWRVIP-18, Revision 1 recommendations.

   On Unit 1, in 2002 a recordable indication was identified on weld P3bA using UT examination. The indication was confirmed by visual examination and evaluated as acceptable for continued operation. This indication was re-examined in 2004 using EVT-1 methods and determined to be 1.1 inches long. Re-examination in 2006, 2008, and 2010 determined that the crack length had not increased. In 2006, a recordable indication was identified at weld P8aC that was determined to be the result of voids in the weld overlay buildup during original construction. The resulting evaluation concluded that the condition was acceptable for continued operation with no further evaluation required. Also in 2006, cracked tack welds were identified on two bolts on core spray piping bracket PB7. Evaluation concluded that this condition was acceptable for continued operation.

   On Unit 2, in 2005 a scrape mark was identified on the “D” core spray sparger at the SB08 lower bracket location. This condition was evaluated as acceptable for continued operation. No indications of cracking were identified during examinations performed on core spray system vessel internal components in 2007 and 2009.

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 by qualified personnel, are capable of detecting flaws and other indications of possible aging-related degradation of reactor vessel internal components. The example demonstrates that deficiencies are entered into the corrective action program and appropriate actions are taken to evaluate deficiencies. This example also demonstrates that LGS has had good performance relative to cracking in core spray spargers.

5. Cracking has occurred at some BWRs in high pressure coolant piping, instrument piping and in the core support top guide structure. LGS has been performing ISI examinations of the core support structure top guide per BWRVIP guidelines and high pressure coolant piping per ASME Code Section XI, IWB and IWC requirements respectively and no cracking has been identified. In 1997, during the refueling outage ISI activity, a small leak was identified on a Unit 2 reactor vessel instrumentation nozzle at a crack in the nozzle safe-end to piping socket weld. The weld and flaw were removed and analyzed to determine the root cause. Non-destructive examination identified a 0.2-inch long axial crack in the heat-affected zone of the weld. The root cause of the crack initiation was determined to be improper fit-up such that the instrument line was welded into the nozzle safe-end at a 6-degree offset resulting in extreme localized stresses, crack initiation, and crack propagation. To address the extent of the condition, ultrasonic examinations were performed during the 1997 refueling outage on the remaining Unit 2 instrumentation nozzles. Also, surface examination using liquid penetrant and a verification of proper fit-up was performed on all Unit 2, 2-inch instrument nozzles that were not inspected during the previous refueling outage. No additional adverse conditions were identified. The instrument line to the nozzle safe-end was repaired with proper fit-up. This is the only cracking issue identified for LGS Units 1 and 2 in ASME Code Class 1 small-bore piping during their operating history. The root cause analysis concluded that this crack was not caused by IGSCC or fatigue.

   This example demonstrates that LGS has not experienced cracking in core support structure top guides or in high pressure coolant piping. 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 implementation of the Water Chemistry program to prevent IGSCC, have been effective. The example also demonstrates that deficiencies are entered into the corrective action program and appropriate actions are taken to evaluate significant deficiencies to determine the root cause, implement additional examinations to determine the extent of condition, and implement corrective actions to prevent recurrence.

6. A Focused Area Self-Assessment (FASA) was performed for the ISI program in 2008. The FASA identified deficiencies in the administration of the program in accordance with corporate procedures and standards. As a result, program administrative procedures and documents were prepared or revised to be consistent with corporate engineering standards and governing procedures. The program is now in compliance with corporate program guidance. This improvement results in improved confidence that the ISI program is implemented in compliance with ASME Code and licensing bases commitments. The FASA also performed sample verification that several pressure test boundaries are properly defined and tested as intended by the test procedures at the proper frequency. The FASA concluded that the pressure test boundaries were properly defined and tested by the procedures at the proper frequencies.

The operating experience relative to the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program did not show any adverse trend in performance. The examination methods 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 ISI Program, of which the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program is a part, are performed to identify the areas that need improvement to maintain the quality performance of the program. 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 the aging effects of cracking and loss of fracture toughness 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.2.1.2 Water Chemistry

Program Description

The Water Chemistry aging management program is an existing 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 Boiling Water Reactor Vessel and Internals Project (BWRVIP-190, Electric Power Research Institute - 1016579).

The Water Chemistry program consist of monitoring, trending, and controlling the chemical environments of those systems that are exposed to reactor water, 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 include the reactor vessel, reactor internals, piping, piping elements and piping components, heat exchangers, and tanks. Reactor water, 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 and cracking for components exposed to sodium pentaborate, steam and reactor coolant environments. 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 aging effects on SLC System components subject to the sodium pentaborate environment relies on monitoring and control of SLC poison storage tank makeup water chemistry. The makeup water is monitored in lieu of the sodium pentaborate solution in the storage tank, because the sodium pentaborate would mask the chemistry parameters monitored. The chloride content of the sodium pentaborate powder is certified by the manufacturer to have low levels of chloride contamination.

The Auxiliary Steam System contains boiler treated water and auxiliary steam that is controlled in accordance with plant procedures and industry standards. The effectiveness of the water chemistry program will be verified by a one-time inspection of selected SLC and Auxiliary Steam System components as part of the One-Time Inspection (B.2.1.22) program.

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 aging management 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. This inspection will be performed as part of the One-Time Inspection (B.2.1.22) program. This program includes provisions specified by NUREG-1801 for the verification of proper 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.

Exceptions to NUREG-1801

None.

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 during the period of extended operation:

1. Several plant design improvements have been made that resulted in improved feedwater chemistry, reactor chemistry, and reduced radwaste generation. The original design of powdered resin filter demineralizers and admiralty brass (copper alloy) condensers was a major contributor to the extensive Crud Induced Localized Corrosion fuel failures experienced during the second operating cycle of Unit 1. Feedwater copper was on average 0.5 ppb and feedwater iron 1-3 ppb. In 1992-1993 both units were retrofitted with full flow condensate deep bed demineralizers. Once the deep beds were proven to remove the soluble contaminants, the filter demineralizers were modified to accept 1 micron filters that did not require a resin precoat. The use of prefilters allows the deep bed resin to remain in place, which enhances both performance and effective life. This resulted in improvements in feedwater chemistry, reactor chemistry, and reduced radwaste generation. Feedwater copper reduced to less than 0.01 ppb, and feedwater iron reduced to less than 0.1 ppb. A zinc injection system was installed to maintain the optimal levels of zinc and iron. Crud Induced Localized Corrosion has not been experienced since installing the deep beds. Reactor water sulfates and chlorides both dropped to less than 1.0 ppb. The installation of the pre-filters allowed the Water Chemistry program to bring the feedwater copper and iron concentrations to desired levels since 1993.

2. As a result of daily chemistry reviews, it was identified that Unit 2 feedwater insolulable iron had been below the goal of 0.5 ppb for most of December 2003. A trend of feedwater insoluble iron showed less stability in the Unit 2 values compared to Unit 1. Data was reviewed from 2000-2003 and a common cause analysis was performed. The analysis determined that the feedwater sample lines for Unit 2 were 0.5-inch diameter, and for Unit 1 they were 0.375-inch. In order to keep particulates such as iron suspended in the sample stream, a minimum flow velocity of 6 feet per second (fps) is required. For a 0.5-inch sample line, that would require a flow rate of over 2 gpm. The flow rate is less than half that, and the sample chillers are not capable of handling the flows required. This resulted in a large amount of variability in the samples between Unit 1 and Unit 2. On Unit 1, the smaller diameter sample line reduced the magnitude of the problem. In addition, the length of the sample line from the common feedwater header to the sample sink is longer on Unit 2 than it is on Unit 1, which further aggravates the problem of insufficient sample velocity. As a result of the analysis, Chemistry sampling practices were changed from a final feedwater sample point to getting an average from each feedwater train. The sample lines on the individual trains are much shorter than the final feedwater sample point and therefore allow for a more accurate and representative sample. This example illustrates that the water chemistry program is effective in identifying discrepancies in the parameters monitored as well as identifying and implementing corrective actions.

3. In December 2004, it was identified that Unit 2 reactor water hydrogen had been steadily trending down. Unit 2 was beginning a coast down period toward a refueling outage. However, Unit 2 in comparison to Unit 1 differed greatly in reactor water dissolved hydrogen with both units at 100 percent power. Unit 1 was stable at approximately 22 ppb in comparison to Unit 2, which was trending down and was at 12 ppb. Unit 2 reactor dissolved hydrogen was within procedural and EPRI goals. An issue report was generated to document the downward trend in Unit 2 reactor water dissolved hydrogen and to document the apparent difference between Unit 1 and Unit 2 reactor water dissolved hydrogen with both units at the same reactor power. The results of the evaluation determined that feedwater and reactor water were within the expected range, and the molar ratio of H_2:O_2 in reactor water was sufficient to mitigate IGSCC.

   The evaluation also stated that hydrogen injection rate varies with reactor feedwater flow rate but it is not a linear function by design. The curve is steeper at full power to prevent an overdose of hydrogen due to minor fluctuations in feedwater flow or H_2 flow controllers. Therefore, the fact that Unit 2 was at a reduced feedwater flow resulted in the decreasing trend in dissolved hydrogen. This example illustrates that the Water Chemistry program is effective in monitoring, trending and detecting unexpected parameters as well as investigating and resolving the reason for the unanticipated chemistry value.

4. On March 24, 2006 during startup following a refueling outage, increasing trends in Unit 1 reactor water conductivity and chlorides were detected. Conductivity and chloride concentration continued to rise, peaking at 9.4 uS/cm and 1346 ppb respectively. The increase in concentration exceeded chemistry action levels. The LCO required that with chloride >100 ppb or conductivity > 2.0 uS/cm exceeded continuously for more than 48 hours, be in hot shutdown within the next 12 hours and in cold shutdown within the following 24 hours. Later that day, reactor water chemistry conductivity and chloride levels were reduced below the required limits.

   The Root Cause Investigation included a comprehensive review of plant programs and system maintenance performed during the outage. Based on the characteristic of the excursion and the chemical concentrations in the reactor, the most probable source of the reactor water conductivity and chlorides was a chlorinated solvent. Based on conductivity, chloride concentration, and the fact that the excursion also resulted in pH below the goal of 5.6, there are two areas of concerns: vessel internals, and fuel cladding. Chlorides do not directly attack the zirconium alloy cladding, and the short duration of the excursion was not long enough for the low pH to affect the cladding. In regards to vessel internals, the excursion occurred above 200 degrees F without Hydrogen Water Chemistry in service. This allowed cracks to grow at the normal water chemistry crack growth rate. The crack growth rate was calculated and determined that the amount of crack extension would not significantly affect the life of the component. However, due to potential crack flanking of the noble metal coating, reapplication of noble metals was recommended. This example illustrates that the Water Chemistry program is effective in analyzing the extent of the chemistry excursions and evaluating the effects of these deviations.

The operating experience of the Water Chemistry program did not show any adverse trend in performance. Problems identified would not cause impact to the safe operation of the plant, and adequate corrective actions were taken to prevent recurrence. Appropriate guidance for re-evaluation, repair, or replacement is provided for locations where degradation is found. Assessments of the Water Chemistry program are performed to identify the areas that need improvement to maintain the quality performance of the program. Therefore, there is confidence that the implementation of the Water Chemistry program will effectively identify degradation prior to failure.

Conclusion

The existing Water Chemistry program provides reasonable assurance that the aging effects of loss of material, cracking and reduction of heat transfer 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.2.1.3 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 provides for ASME Section XI inspections of reactor head closure studs and associated nuts, bushings, flange threads, and washers for cracking and loss of material. The Reactor Head Closure Stud Bolting program manages these aging effects in air with reactor coolant leakage environment. The frequency of monitoring is adequate to prevent significant degradation. The program is based on the examination and inspection requirements specified in the ASME Section XI Code, Subsection IWB, Table IWB-2500-1, and preventive measures described in NRC Regulatory Guide 1.65, "Materials and Inspection for Reactor Vessel Closure Studs."

The current ISI Program plan for the third ten-year inspection interval (February 1, 2007 through January 31, 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 incorporated into 10 CFR 50.55a twelve months before the start of the inspection interval.

The Reactor Head Closure Stud Bolting program implements ASME Section XI inspection requirements through the ISI Program plan. The inspections monitor for cracking, loss of material, and coolant leakage.

The program uses visual and volumetric examinations in accordance with the general requirements of Section XI, Subsection IWA-2000. The Reactor Head Closure Stud Bolting program was developed in accordance with the requirements detailed in the ASME Code, Section XI, Division 1, Subsections IWA, IWB, Mandatory Appendices and Inspection Program B of IWA-2432.

ASME Section XI allows for a number of examination methods to be used for volumetric and visual inspections. The flange threads and studs receive a volumetric examination and the surfaces of nuts and washers are inspected using a VT-1 examination. All pressure-retaining boundary components in Examination Category B-P receive a visual VT-2 examination during the system leakage test and the system hydrostatic test.

The extent and schedule for examining and testing the reactor head closure studs, nuts, bushings, flange threads, and washers is specified in Table IWB-2500-1 for B-G-1 components, "Pressure Retaining Bolting Greater than 2 Inches in Diameter."

Indications and relevant degraded conditions detected during examinations are evaluated in accordance with ASME Section XI Subsection IWB-3100 for Class 1 components by comparing ISI results with the acceptance standards of IWB-3400 and IWB-3500. Specifically, 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 Section XI.

The Reactor Head Closure Stud Bolting program includes the preventive measures to mitigate cracking described in the NRC Regulatory Guide 1.65, which includes the use of approved corrosion inhibitors and lubricants. The reactor head closure studs, nuts, bushings, flange threads, and washers are fabricated with approved materials and surface treated with an acceptable phosphate coating to inhibit corrosion and reduce SCC and IGSCC. In addition, a stable lubricant that does not contain molybdenum disulfide is applied to the nuts, threads and all bearing surfaces of the nuts and washers prior to reactor vessel head re-installation.

The reactor head closure studs are constructed of ASME SA540 Grade B24, Class 3 material, which has a maximum tensile strength of less than 170 ksi. This complies with the NRC Regulatory Guide 1.65.

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.

Exceptions to NUREG-1801

None.

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 during the period of extended operation:

<u>Unit 1</u>

1. During the 2002 outage, reactor head closure studs, flange threads, and nuts 1 through 38 were examined using the UT method. Reactor head closure washers 1 through 38 were examined using the VT-1 method. There were no recordable indications.

2. During the 2006 outage, reactor head closure studs, flange threads, and nuts 39 through 76 were examined using the UT method. Reactor head closure washers 39 through 76 were examined using the VT-1 method. There were no recordable indications.

3. During the 2010 outage, reactor head closure studs and flange threads 1 through 26 were examined using the UT method. Reactor head closure nuts and washers 1 through 26 were inspected using the VT-1 method. There were no recordable indications.

Unit 2

1. During the 2003 outage, reactor head closure studs (1 through 17 and 22 through 26), flange threads and nuts 1 through 26 were examined using the UT method. Reactor head closure washers 1 through 17 and 22 through 30 were inspected using the VT-1 method. There were no recordable indications.

2. During the 2005 outage, reactor head closure studs, flange threads, and nuts 27 through 51 were examined using the UT method. Reactor head closure washers 27 through 51 were inspected using the VT-1 method. There were no recordable indications.

3. During the 2009 outage, reactor head closure studs (52 through 76 and 18 through 21) and flange threads 52 through 76 were examined using the UT method. Reactor head closure washers and nuts 18 through 21 and 52 through 76 were inspected using the VT-1 method. There were no recordable indications.

The operating experience of the Reactor Head Closure Stud Bolting program did not identify an adverse trend in performance or signs of age related degradation. This has been demonstrated by past satisfactory test and inspection results. Since no age related degraded conditions have existed, no investigations and corrective actions have been required. Historically, inspections have found the reactor studs, nuts, bushings, flange threads, and washers to be in satisfactory condition. No studs, nuts, or washers have ever been replaced or repaired as a result of age related degradation. Appropriate guidance for re-evaluation, repair, or replacement is provided for locations where degradation is found. Therefore, there is confidence that continued implementation of the Reactor Head Closure Stud Bolting program will effectively identify degradation prior to failure during the period of extended operation.

Conclusion

The existing Reactor Head Closure Stud Bolting program provides reasonable assurance that 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.2.1.4 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 effects of cracking of reactor vessel internal attachment welds exposed to reactor coolant through water chemistry and augmented in-service inspections. The program also manages the effects of loss of material due to wear of the steam dryer support brackets. The program incorporates the inspection and evaluation recommendations of BWRVIP-48-A. 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 through 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.

Evaluation of indications is conducted consistent with IWB-3500 and IWB-3600 of Section XI of the ASME Code 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 Section XI. If the flaw exceeds the requirements of IWB-3600, repair and replacement is performed consistent with the requirements of ASME 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 during the period of extended operation:

1. Examinations of the Unit 1 vessel internal attachment welds were performed using EVT-1 visual techniques during the 2000, 2002, 2004, and 2006 refueling outages. The examinations included all of the jet pump riser brace support pads, the feedwater sparger attachment welds, the steam dryer support bracket attachment welds, and the core spray bracket attachment welds. No indications were identified. Examination of the guide rod bracket attachment welds was performed using VT-3 visual techniques in 2000 and 2006. No indications were identified. Examination of the surveillance sample holder attachment welds was performed using VT-1 visual techniques in 1998 and 2006. No indications were identified.

2. Re-inspection of the Unit 1 vessel internal attachment welds using EVT-1 visual techniques was performed in 2008 on two of the jet pump riser brace support pads, three of the feedwater sparger end brackets, two of the core spray brackets, and one of the steam dryer support bracket attachment welds. No indications were identified other than a minor wear mark on the steam dryer support bracket. In accordance with the program requirements, a condition report was generated to evaluate the wear. When current results were compared to the inspection video from 2002, there was no change in condition. Therefore, the condition of the attachment weld was determined to be acceptable.

3. Re-inspection of the Unit 1 vessel internal attachment welds using EVT-1 visual techniques was performed in 2010 on two of the core spray brackets. No indications were identified. Re-inspection of all four steam dryer support bracket attachment welds was performed using visual techniques in 2010. Wear was identified on all four brackets. In accordance with the program requirements, a condition report was generated to evaluate the wear. The indications on three of the four brackets were considered normal wear. The wear on one of the brackets was considered notable. The probable cause of the wear was determined and the condition of the bracket was determined to be acceptable for operation for a cycle. In accordance with the program requirements, scope expansion was defined. The scope expansion included additional examinations of the steam dryer hold down brackets (on the underside of the RPV head) and the steam dryer seismic blocks (on the steam dryer support ring) were scheduled during the 2010 outage. No indications were identified on the steam dryer hold down brackets. Three of the four steam dryer seismic blocks were reported as having some minor indications of wear but were determined to be acceptable for continued operation.

4. Examinations of the Unit 2 vessel internal attachment welds were performed using EVT-1 visual techniques during the 2001, 2003, 2005, 2007, and 2009 refueling outages. The examinations included all of the jet pump riser brace support pads, the feedwater sparger attachment welds, the steam dryer support bracket attachment welds, and the core spray bracket attachment welds. No indications were identified. Examination of the guide rod bracket attachment welds was performed using VT-3 visual techniques in 2005. No indications were identified. Examination of the surveillance sample holder attachment welds was performed using VT-1 visual techniques in 2003 and 2007. No indications were identified.

These examples illustrate how condition monitoring in accordance with BWRVIP inspection guidelines is used to effectively manage the effects of cracking in the vessel internal attachment welds and loss of material due to wear of the steam dryer support brackets. The reactor vessel internal attachment welds have been inspected for cracking due to SCC or IGSCC since the plant has been in operation. The inspections have not detected cracks in the reactor vessel attachment welds. The lack of indications in the attachment welds can be attributed in part to effective water chemistry, suitable design, and effective installation practices. Appropriate guidance for re-evaluation, repair, or replacement is provided for locations where degradation is found. The examples also demonstrate that, when deficiencies are found, appropriate corrective actions are taken through the corrective action program, including actions to determine the cause and extent of the condition.

Therefore, there is confidence that continued implementation of the BWR Vessel ID Attachment Welds program will effectively identify cracking and loss of material in the vessel internal attachment welds prior to a loss of an intended function during the period of extended operation.

Conclusion

The existing BWR Vessel ID Attachment Welds program provides reasonable assurance that the aging effects of cracking and loss of material will be adequately managed so that the intended functions of vessel ID attachment welds 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 effects of cracking in the reactor vessel feedwater nozzles exposed to reactor coolant. The program provides for examination of feedwater nozzles for cracking 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 in-service inspection (ISI) program and specifies periodic ultrasonic test (UT) examination of critical regions of the feedwater nozzle. The inspections are performed at intervals not exceeding ten years.

In response to NUREG-0619, design changes were made to the feedwater nozzles prior to initial reactor operation to mitigate or prevent thermally induced fatigue cracking. The current design does not include cladding on the nozzle inner surface and uses a triple thermal sleeve feedwater sparger design with two ring seals.

As recommended in NUREG-0619, mitigation of cracking in the feedwater nozzle is accomplished using a feedwater level control system that utilizes a low flow controller with smaller control valves 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. LGS 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.

The program monitors the effects of cracking on the intended function of the feedwater nozzles by detection and sizing of cracks by augmented ISI in accordance with ASME Code, Section XI, Subsection IWB and the recommendations within GE-NE-523-A71-0594-A, Revision 1. Flaw indications are evaluated in accordance with ASME Code, Section XI, IWB-3100, using the acceptance standards of IWB-3512 as directed by IWB-3410 and 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 continue to be effective in assuring that intended functions are maintained consistent with the current licensing basis during 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. LGS started operation in 1986 with the important design features recommended by NUREG-0619 incorporated into the plant design, including eliminating 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 a low flow control system for use during low power operations, and the Reactor Water Cleanup System was designed to return flow to the reactor through both feedwater loops per NUREG-0619 recommendations. 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 and the existing augmented ISI program for feedwater nozzle inspection to effectively manage the material condition of the feedwater nozzles relative to cracking. The lack of significant indications of cracking in the feedwater nozzles to date 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, May 2000, "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 ultrasonic testing (UT) techniques recommended within GE-NE-523-A71-0594-A, Revision 1. Recordable indications were noted during the following inspections of feedwater nozzles and were evaluated as acceptable per ASME Code, Section XI Article IWB-3000 criteria:

   - The Unit 1 N4A feedwater nozzle-to-vessel weld in 2002
   - The Unit 2 N4D feedwater nozzle-to-vessel weld in 2003
   - The Unit 2 N4A feedwater nozzle-to-vessel weld in 2007

   A fracture mechanics analysis was performed in 2000 to validate the inspection interval based on the requirements of GE-NE-523-A71-0594-A, Revision 1, Table 6.1. For inspection Method 1 (Manual UT) the inspection frequency is 4 years, and for inspection Method 3 (automated, full RF recording) the inspection frequency is 10 years to provide timely indication of detection of cracking. Both methods have been used at LGS.

   In addition, as part of the ISI program, a pressure test of the reactor vessel 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.

These examples provide objective evidence that the existing BWR Feedwater Nozzle program is effective in monitoring and detecting the aging effects of cracking in the feedwater nozzles. Appropriate guidance for evaluation, repair, or replacement is provided and utilized for locations where indication of cracking is found. Therefore, there is confidence that continued implementation of the BWR Feedwater Nozzle program will effectively identify cracking of the feedwater nozzles prior to a loss of an intended function during the period of extended operation.

Conclusion

The existing BWR Feedwater Nozzle program provides 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.2.1.6 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 provides for examination of the CRDRL reactor pressure vessel nozzle for cracking. Modifications were implemented on LGS 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 as part of the original plant design. Therefore, augmented inspections required by NUREG-0619 are not applicable. The program performs in-service inspections (ISI) to monitor the effects of cracking of the CRDRL nozzle. The CRDRL nozzle is exposed to a reactor coolant environment.

The CRDRL nozzle and nozzle-to-vessel weld examinations are performed at the frequency specified in ASME Code, Section XI, 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. The inspection methods used by the program have been proven effective in detecting cracking in reactor pressure vessel nozzles.

LGS 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-3512 as directed by IWB-3410 and Table IWB-2500-1. Flaws that do not meet the acceptance criteria in IWB-3512 may be evaluated analytically per IWB-3600 criteria. Repair and replacement would be performed consistent with the requirements of ASME Section XI, IWA-4000.

The BWR Control Rod Drive Return Line Nozzle program will be enhanced as described below to provide reasonable assurance that cracking will be adequately managed during the period of extended operation.

NUREG-1801 Consistency

The BWR Control Rod Drive Return Line Nozzle aging management program will be 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

Prior to the period of extended operation, the following enhancement will be implemented in the following program element:

1. Specify an extended volumetric inspection of the nozzle-to-cap weld to assure that the inspection includes base metal to a distance of one pipe wall thickness or 0.5 inches, whichever is greater, on both sides of the weld. **Program Element Affected: Detection of Aging Effects (Element 4)**

Operating Experience

The following examples of operating experience provide objective evidence that the BWR Control Rod Drive Return Line Nozzle program will continue to be effective in assuring that intended functions are maintained consistent with the current licensing basis during 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 delineated 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 LGS design eliminated the use of a CRD return line and capped the CRDRL nozzle prior to reactor power operations. These design features significantly reduce thermal fatigue and the likelihood of cracking in the nozzle. The CRDRL nozzles on both LGS Units 1 and 2 have been examined several times since the plant started operation in 1986 with no flaws detected.

   This example illustrates how industry operating experience and best practices relative to plant and nozzle design was implemented at LGS to minimize the probability of cracking in this nozzle. The lack of indications can be attributed in part to implementing the design recommendations defined in NUREG-0619.

2. During the spring 1988 refueling outage, a crack caused by intergranular stress corrosion cracking (IGSCC) was identified in a LGS Unit 1 recirculation inlet nozzle-to-safe end weld in the alloy 182 to alloy 82 dissimilar weld interface. The Unit 1 CRDRL nozzle also has alloy 182 to 82 weld interface between the nozzle and the cap. This event, and similar operating experience from other utilities relative to cracking at alloy 182 to 82 dissimilar welds, was applied to result in performance of Mechanical Stress Improvement Process (MSIP) on the nozzle-to-cap weld on the Unit 1 CRDRL nozzle in 1994. The Unit 1 CRDRL nozzle cap is fabricated from SA-508 CL2 carbon steel material, which is resistant to IGSCC.

Since Unit 2 was not yet in operation, its CRDRL nozzle was modified to eliminate the alloy 182 to 82 weld interface in contact with the reactor coolant by adding an alloy 82 overlay over the alloy 182 to 82 weld between the nozzle and cap. This resulted in the alloy 182 to 82 dissimilar weld not being in contact with reactor coolant, minimizing the probability of cracking in the nozzle-to-cap weld. The Unit 2 CRDRL nozzle cap is fabricated from SA-182-F316LN stainless steel material, which is resistant to IGSCC.

This example illustrates how plant and industry operating experience, best practices relative to nozzle design, and use of MSIP were implemented to minimize the probability of cracking in the CRDRL nozzles. The lack of indications can be attributed in part to the MSIP performed on the Unit 1 nozzle and the design change performed on the Unit 2 nozzle.

3. The UT inspections of the CRDRL nozzle inside radius and nozzle-to-vessel weld and nozzle-to-cap weld of the CRDRL nozzle were conducted in accordance with ASME Section XI, Table IWB-2500-1 in 1992, 1998, and 2008 on Unit 1, and in 1995 and 2005 on Unit 2. The last inspection performed on Unit 1 used a Performance Demonstration Initiative (PDI) qualified UT detection technique. There have not been any indications of cracking discovered during 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 CRD 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 inspection methods and an effective ISI program are being implemented to verify that cracking is not initiating at these nozzles and that their material condition is being effectively managed.

These examples provide objective evidence that the BWR CRD Return Line Nozzle program performs appropriate in-service inspection activities to detect flaws. These examples also illustrate that industry operating experience and best practices were effectively utilized to improve the design and material condition of the nozzles and effectiveness of the inspection process. Appropriate guidance for evaluation, repair, or replacement is provided if degradation is identified. Therefore, there is confidence that continued implementation of the enhanced 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 enhanced BWR Control Rod Drive Return Line Nozzle program will provide reasonable assurance that the aging effect of cracking will be adequately managed so that the intended functions of the CRD return line nozzles 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 mitigation program that manages intergranular stress corrosion cracking (IGSCC) in reactor coolant pressure boundary piping and piping components made of stainless steel and nickel-based alloy in a reactor coolant environment. 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. Mechanical Stress Improvement Process (MSIP) has been performed on several welds determined to be susceptible to IGSCC to reduce the effects of cracking. 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 reactor coolant pressure boundary piping, welds and components through the implementation of the ISI program in accordance with ASME Section XI. Inservice inspections, performed as an augmentation of the Section XI ISI program, are designed to maintain structural integrity and ensure that aging effects will be discovered and repaired before the loss of intended function of the components. The inspection frequency for welds classified as Category B through G per NRC GL 88-01 has been modified 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 have been subsumed into the Risk-Informed Inservice Inspection (RISI) 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 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 weld overlay repair and stress improvement or replacement is provided in several industry documents, including NRC GL 88-01, NUREG-0313, Revision 2, ASME Section XI, Subsection IWA-4000, and specific code cases. MSIP has been performed for numerous welds without prior indications of cracking, and on one Unit 1 weld that had an indication of prior cracking.

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 continue to be effective in managing cracking to assure that intended functions of Reactor Coolant Pressure Boundary components managed by the program are maintained consistent with the current licensing basis during the period of extended operation:

1. During the Unit 1 1989 refueling outage, a volumetric ultrasonic test (UT) identified a cracking indication in a reactor recirculation nozzle to safe end weld that resulted in this weld being classified as IGSCC Category F per NRC GL 88-01 and NUREG-0313, Revision 2 guidelines. MSIP was performed on the weld in 1992. The weld was re-examined following the MSIP in 1992 and during each of the following four refueling outages per NRC GL 88-01 guidance. Since none of these examinations indicated crack growth, the weld was upgraded to Category E in accordance with BWRVIP-75-A guidance. Examination of this weld has continued during every other refueling outage per BWRVIP-75-A guidance for Category E welds with no crack growth indicated.

   This example illustrates how implementation of industry operating experience from NRC GL 88-01 and volumetric ultrasonic testing was applied to identify a cracking indication in a susceptible reactor coolant pressure boundary weld. This example demonstrates effective use of industry recommendations to apply MSIP on a weld with a crack indication as a mitigating action to reduce the stresses in the weld and probability for continued stress corrosion cracking. This example also demonstrates how the industry guidelines per NRC GL 88-01, NUREG-0313, 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.

2. Cracking in the Control Rod Drive Return Line (CRDRL) nozzle has occurred in several BWR plants as delineated 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 LGS design eliminated the use of a CRD return line and capped the CRDRL nozzle prior to reactor power operations. These design features significantly reduce thermal fatigue and the likelihood of cracking in the nozzle.

   During the Unit 11989 refueling outage, a UT examination identified a cracking indication in a reactor recirculation nozzle to safe end weld in the alloy 182 to alloy 82 dissimilar weld interface. The Unit 1 CRDRL nozzle also has alloy 182 to 82 weld interface between the nozzle and the cap. This event and similar operating experience from other utilities relative to cracking in dissimilar nickel alloy welds, was applied to result in performance of MSIP on the CRDRL nozzle-to-cap weld on the Unit 1 CRDRL nozzle in 1994. The Unit 1 CRDRL nozzle cap is fabricated from SA-508 CL2 carbon steel material, which is resistant to IGSCC. Since Unit 2 was not yet in operation, its CRDRL nozzle was modified to eliminate the alloy 182 to 82 weld interface in contact with the reactor coolant by adding an alloy 82 overlay over the alloy 182 to 82 weld between the nozzle and cap. This resulted in the alloy 182 to 82 dissimilar weld not being in contact with reactor coolant, minimizing the probability of cracking in the nozzle-to-cap weld. The Unit 2 CRDRL nozzle cap is fabricated from SA-182-F316LN stainless steel material, which is resistant to IGSCC. The Unit 1 CRDRL nozzle, including the nozzle-to-cap weld was examined in 1992, 1998 and 2008. The Unit 2 CRDRL nozzle, including the nozzle-to-cap weld was examined in 1995 and 2005. None of the inspections identified indications of cracking.

   This example illustrates how plant and industry operating experience, best practices relative to nozzle and safe end design, and use of MSIP were implemented to minimize the probability of cracking in the CRDRL nozzles. The lack of indications can be attributed in part to the MSIP performed on the Unit 1 nozzle and the design change performed on the Unit 2 nozzle.

3. NUREG-0313, Revision 2 and NRC GL 88-01 provided recommendations to perform MSIP on welds that were susceptible to stress corrosion cracking to reduce the tensile stresses and the susceptibility for stress corrosion cracking. MSIP was recommended to be performed prior to two years of operation. MSIP was performed on Unit 1 in 1992 and 1994 on 23 welds within the scope of the NRC GL 88-01 augmented ISI program that did not have evidence of prior cracking, and on 1 weld that did have indications of prior cracking. MSIP on Unit 1 was performed after more than two years of operation. MSIP was performed on Unit 2 prior to reactor operations on 18 welds. The augmented ISI program for stress corrosion cracking examinations put in place to meet NRC GL 88-01, NUREG-0313, and BWRVIP-75-A guidelines has been in place since 1988 and has not identified any indications of cracking in susceptible welds following the application of MSIP to those welds that were determined to be most susceptible.

This example illustrates how industry operating experience was effectively used to apply 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 examined within the augmented ISI program for stress corrosion cracking can be attributed in part to the MSIP performed on the welds determined to be most susceptible to stress corrosion cracking.

4. At another BWR, an IGSCC type indication was identified in a Category C dissimilar weld in one nozzle to safe-end weld in October 2007. This indication was previously identified but incorrectly classified due to an inadequate examination. The BWRVIP requested all stations that have Category C dissimilar welds to review their previously performed examination data relative to the issue. The review performed for LGS included verifying that correct transducers were used, full interrogation of any indication by the UT examination was ensured, and the data was analyzed using the 'MicroTomo' analysis platform by personnel qualified in accordance with PDI Supplement 10 requirements. This review identified the following two potential issues on Unit 1:

    - Weld DCA-319-1 at N5A, 1B core spray nozzle to safe end, had been last inspected in 1998 when a flaw was identified as a subsurface planar flaw and evaluated as acceptable per ASME Section XI, Table IWB 3514-2. The review identified an area that may connect the evaluated flaw with the inside of the pipe, making the prior evaluation invalid. Follow-up inspection in 2008, following additional surface preparation, resulted in no recordable indications identified in this weld.

    - Weld DCA-319-1 at N5B, 1A core spray nozzle to safe end, had also been last inspected in 1998 and the review identified that the examination was not accurately interrogated, precluding complete characterization of the examination volume. Follow-up inspection in 2008, following additional surface preparation, resulted in no recordable indications identified in this weld.

    This example illustrates how industry operating experience was used to apply improved examination and evaluation technologies to verify the condition of welds within the scope of NRC GL 88-01.

The operating experience of the BWR Stress Corrosion Cracking program did not identify an adverse trend in performance. Plant and industry operating experience was applied to implement best practices relative to nozzle and safe end design, and use of MSIP to minimize the probability of cracking in the welds determined to be most susceptible to stress corrosion cracking. Periodic examinations of welds determined to be susceptible to stress corrosion cracking have been performed since the NRC GL 88-01 was issued in 1988 and only one indication of stress corrosion cracking has been identified. For that condition, effective corrective actions were taken to evaluate and mitigate the condition including evaluation of the crack, performance of MSIP, and periodic re-inspection of the indication per industry guidelines. Guidance for re-evaluation, repair, or replacement for locations where cracking is identified is in accordance with NRC GL 88-01, ASME Code, Section XI, and appropriate BWRVIP reports. Therefore, there is confidence that continued implementation of the BWR Stress Corrosion Cracking program will effectively manage cracking of reactor coolant pressure boundary piping and components prior to failure or loss of intended function.

Conclusion

The existing BWR Stress Corrosion Cracking program provides reasonable assurance that the cracking 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.2.1.8 BWR Penetrations

Program Description

The BWR Penetrations aging management program is an existing condition monitoring and mitigation program that manages the effects of cracking of the reactor vessel instrumentation penetrations, and control rod drive (CRD) housing and incore-monitoring housing penetrations exposed to reactor coolant through water chemistry and inservice inspections. The scope of the program includes beltline instrumentation nozzles and other instrumentation nozzles; except for the Standby Liquid Control (SLC) System to core plate differential pressure (dP) instrumentation nozzle and the jet pumps instrumentation nozzles, which are in the scope of the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1) program. 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," and the water chemistry recommendations as described in the Water Chemistry (B.2.1.2) program. The reactor water chemistry program monitors and controls known detrimental contaminants in accordance with the recommendations of BWRVIP-190 or later revisions. The program is implemented through station procedures that provide for mitigation of cracking through water chemistry and condition monitoring through examinations of reactor vessel instrument penetrations welds.

The BWR Penetrations program monitors the effects of SCC and IGSCC by performing inspections of the instrumentation nozzles and CRD housing and incore-monitoring housing penetrations as part of the ISI program per the requirements of Section XI, Table IWB-2500-1 of the ASME Code. Inspections are performed in accordance with the guidelines of BWRVIP-49-A for the instrument penetrations and BWRVIP-47-A for the CRD housing and incore-monitoring housing penetrations. A description of the ISI program, including the controlling Edition of ASME Section XI, is provided in ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1) program. Each refueling outage, a visual inspection (VT-2) of the instrument penetration welds and CRD housing and incore-monitoring housing penetrations is performed during the reactor coolant pressure boundary system leakage test. The guidelines of BWRVIP-49-A and BWRVIP-47-A provide information on the type of penetrations, evaluate their susceptibility and consequences of failure, and define the inspection strategy to assure safe operation.

BWRVIP-27-A addresses the SLC System nozzle. The guidelines of BWRVIP-27-A are applicable to plants in which the SLC system injects sodium pentaborate into the bottom head region of the vessel. At LGS, the SLC system injects sodium pentaborate into the vessel through the ‘B’ loop of core spray, not through the core plate dP instrumentation bottom head penetration. As stated in BWRVIP-27-A, the guidelines within do not apply to plants such as LGS, where SLC injects via Core Spray System piping. At LGS, the instrument penetrations and CRD housing and incore-monitoring housing penetrations are inspected in accordance with ASME Section XI, Table IWB-2500-1 requirements.

Since the inspections are performed using VT-2 during a system leakage test, defects in the penetrations are discovered only if leakage is detected. The leakage would be documented and processed through the corrective action program to determine the need for any expansion of examinations and re-inspection. Repairs would be completed in accordance with ASME Section XI requirements, and a subsequent pressure test conducted.

Flaw evaluations are not applicable to the BWR Penetrations program because cracking is detected by leakage, which must be repaired before returning the component to service.

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 during the period of extended operation.

1. The inspection requirements for reactor vessel instrumentation penetrations, CRD housing and incore-monitoring housing penetrations are implemented as part of the vessel ASME Section XI ISI activities, which is consistent with the recommendations of BWRVIP-49-A and BWRVIP-47-A. As required by ASME Section XI, a reactor coolant pressure boundary system leakage test is performed each refueling outage in accordance with the ISI program. A VT-2 examination by qualified personnel is performed for all reactor coolant pressure retaining components, including the reactor vessel instrument penetrations, CRD housing and incore-monitoring housing penetrations, within the scope of this program. A review of the inspection results from the last two refueling outages for both units (2007, 2008, 2009, and 2010) indicates that there have been no leaks identified for the instrument penetrations, CRD housing and incore-monitoring housing penetrations, managed by this program. This example illustrates how the BWR Penetrations program implements the inspection requirements using the methods and inspection frequency recommended in the appropriate

BWRVIP guideline. The absence of leaks can be attributed to effective water chemistry, suitable design, and appropriate installation practices.

2. In February of 1997, scheduled Unit 2 ISI activities identified a small leak (less than 1 drop per minute) from the top of a Unit 2 instrument nozzle safe end. Non-destructive examination determined that a 0.2-inch crack existed in the heat-affected zone of the safe end connection. The cause of the event was investigated and determined to be improper original installation. Corrective actions taken at the time included replacement of the flawed portion of the instrument connection and review of construction welding records. To address extent of condition, review of pre-service and in-service inspection data for all instrument nozzles on both units, and additional inspections. These additional inspections and reviews confirmed that there were no other configurations with improper installation.

3. Each refueling outage, VT-2 inspections are performed during the reactor coolant pressure boundary system leakage test. A review of the inspection results from the last two refueling outages for both units (2007, 2008, 2009, and 2010) did not reveal a case in which a VT-2 inspection found cracking in a Class 1 component. However, VT-2 inspections have detected leaks at mechanical interfaces such as flanges and valve packing. In each case, the discrepancy is entered in the corrective action program and appropriate action, such as repair, is taken. Although none of the leaks constituted a loss or degradation of the Class 1 pressure boundary, this example demonstrates the inspection techniques and qualified personnel are capable of detecting small leaks in Class 1 components. This example provides reasonable assurance that the inspection techniques used in the BWR Penetrations program are capable of detecting leaks before a loss of intended function.

Review of LGS operating experience demonstrates that the existing BWR Penetrations program has been effective in performing inspections in accordance with industry guidelines, identifying an indication of cracking, and using the corrective action program to correct the condition and prevent recurrence. The absence of cracking due to IGSCC or SSCC demonstrates the effectiveness of the Water Chemistry program to prevent cracking. Appropriate guidance for repair or replacement is provided for locations where degradation is found. Therefore, there is confidence that continued implementation of the BWR Penetrations program will effectively manage cracking 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 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.2.1.9 BWR Vessel Internals

Program Description

The BWR Vessel Internals aging management program is an existing condition monitoring and mitigation program that manages aging of the reactor vessel internals in accordance with the requirements of ASME Code, Section XI and Boiling Water and Internals Project (BWRVIP) reports. The program manages the effects of cracking, loss of material and loss of fracture toughness of vessel internal components in a reactor coolant or steam 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. 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).

The BWR Vessel Internals program includes commitments to the following BWRVIP guidelines for inspection, evaluation, and repair recommendations for the components listed:

<u>Core Shroud:</u> 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.

<u>Core Plate:</u> 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.

<u>Core Spray:</u> Inspections and evaluations are performed in accordance with BWRVIP-18, Revision 1. The program utilizes the guidelines for replacement and repair contained in BWRVIP-16-A and BWRVIP-19-A.

<u>Shroud Support:</u> 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.

<u>Jet Pump Assembly:</u> Inspections and evaluations are performed in accordance with BWRVIP-41, Revision 3. The program utilizes the repair design criteria contained in BWRVIP-51-A.

<u>LPCI Coupling:</u> Inspections and flaw evaluations are performed in accordance with BWRVIP-42, Revision 1. The repair design criteria in BWRVIP-56-A would be utilized in preparing a repair plan.

<u>Top Guide:</u> 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. The inspection schedule per BWRVIP-183 will start prior to the period of extended operation, and will continue through the period of extended operation. The repair design criteria in BWRVIP-50-A would be utilized in preparing a repair plan.

<u>Control Rod Drive Housings:</u> Inspections and evaluations were performed in accordance with BWRVIP-47-A. The program utilizes the repair design criteria contained in BWRVIP-55-A and BWRVIP-58-A.

<u>Lower Plenum:</u> When accessible, inspections and evaluations are performed in accordance with BWRVIP-47-A. The program utilizes the repair design criteria contained in BWRVIP-55-A.

<u>Steam Dryer:</u> Inspections and evaluations are performed in accordance with BWRVIP-139, Revision 1. The program utilizes the repair design criteria contained in BWRVIP-181-A.

The BWR Vessel Internals program determines 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. 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 CFR50.55a.

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 affect 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 (SS), 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-45 would be utilized in developing a repair plan.

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 Element Affected: Scope of Program (Element 1)**

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 5 years after entering the period of extended operation. **Program Elements Affected: 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 BWR Vessel Internals program will continue to be effective in assuring that intended functions are maintained consistent with the current licensing basis during the period of extended operation:

1. 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 stress corrosion cracking (SCC), and weld regions are most susceptible to SCC. This industry experience is documented in NRC Generic Letter 94-03, Information Notices 94-42 and 97-17. The LGS core shrouds are fabricated from Type 304L SS.

In response to the industry experience cited in GL 94-03, IN 94-42, and IN 97-17, baseline core shroud examinations were performed in accordance with BWRVIP-07 requirements on Unit 1 in 1996, and on Unit 2 in 1999. Routine examinations are continuing at the frequency, and using the methods, required by BWRVIP reports, based on historical examination results.

Cracking has been identified in core shroud welds on both Units 1 and 2. Expanded scope inspections and structural evaluations have been performed per BWRVIP guidelines each time new indications were identified.

This example provides objective evidence that the BWR Vessel Internals program implements examination requirements using the methods and inspection frequency recommended in the appropriate BWRVIP guidelines. This example also illustrates that BWRVIP examinations performed by qualified personnel, are capable of detecting flaws in reactor vessel internal components. The example also demonstrates that deficiencies are entered into the corrective action program and appropriate actions are taken to evaluate deficiencies.

2. 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. The original equipment manufacturer, General Electric, issued guidance for this issue in SIL 462. LGS AHCs are classified as a Group 6 design, which is less susceptible to intergranular stress corrosion cracking (IGSCC) than other designs. Examinations were performed on Unit 1 in 1998 using VT-3 examination methods per the recommendations in SIL 462. Examinations were performed in 2004 using EVT-1 methods, and in 2008 using VT-1 methods. Examinations were performed on Unit 2 in 1999 and 2003 using EVT-1 methods, and in 2007 using VT-1 methods. No indications of cracking have been identified on any LGS AHCs. Future examinations of the AHCs will be in accordance with BWRVIP-180, which requires the use of EVT-1 or ultrasonic test (UT) methods for Group 6 AHC design.

   This example provides objective evidence that the BWR Vessel Internals program implements examination requirements using the methods and evaluation frequency recommended in the appropriate industry guidelines.

3. Cracking in core spray spargers has occurred in some BWRs as discussed in NRC Bulletin 80-13 and BWRVIP-18-A. Although earlier examinations were performed to the requirements of NRC IE Bulletin 80-13, baseline examinations of the core spray spargers and associated welds were performed in accordance with BWRVIP recommendations on Unit 1 in 1998, and on Unit 2 in 1999. No indications were detected. The core spray spargers are currently examined in accordance with BWRVIP-18 Revision 1 recommendations.

On Unit 1, in 2002 a recordable indication was identified on weld P3bA using UT examination. The indication was partially confirmed by visual examination and evaluated as acceptable for continued operation. Re-examination in 2004, 2006, 2008, and 2010 determined that the indication length had not increased. In 2006, a recordable indication was identified at weld P8aC, which was verified to be a result of voids in the weld overlay buildup during original construction. The resulting evaluation concluded that the condition was acceptable for continued operation with no further evaluation required. Also in 2006, cracked tack welds were identified on two bolts on core spray piping bracket PB7. Evaluation concluded that this condition was acceptable for continued operation.

On Unit 2, in 2005 a scrape mark was identified on the “D” core spray sparger at the SB08 lower bracket location. This condition was evaluated as acceptable for continued operation. No indications of cracking were identified during examinations performed on core spray system vessel internal components in 2007 and 2009.

This example provides objective evidence that the BWR Vessel Internals program implements examination requirements using the methods and examination frequency recommended in the appropriate BWRVIP guidelines. This example also illustrates that BWRVIP examinations performed by qualified personnel, are capable of detecting flaws and other indications of possible aging-related degradation of reactor vessel internal components. The example also demonstrates that deficiencies are entered into the corrective action program and appropriate actions are taken to evaluate deficiencies.

4. Cracking has occurred in the jet pump assembly, hold-down beam, and jet pump riser pipe elbows in BWRs as reported in NRC Bulletin 80-07 and Information Notices 93-101 and 97-02, respectively. Baseline examinations of the jet pump assemblies in accordance with BWRVIP recommendations began on Unit 1 in 1998 and on Unit 2 in 1999. On Unit 1, in 2002 a crack was identified in a jet pump yoke to riser pipe weld caused by lack of fusion or incomplete blending of the weld during fabrication resulting in stress intensification. The indication was evaluated as acceptable for continued operation and was re-examined in 2004 and 2006 with no signs of growth. In 2006, this location was further stabilized by addition of a slip joint clamp and two auxiliary wedges on each of the affected jet pumps. Slip joint clamps were installed on all 20 jet pumps in 2006. Re-examinations in 2008 and 2010 indicated no flaw growth.

   On Unit 1 in 2004, UT examination identified an indication on the Number 4 jet pump hold down beam resulting in replacement of the beam with an improved design that is less susceptible to IGSCC. In 2008, UT examination of the Number 8 jet pump hold down beam identified an indication. This beam was also replaced with the improved design.

Jet pump assembly examinations performed in accordance with BWRVIP-41-A and later revisions have also identified wear of the main wedges and wedge rods on several jet pumps on Unit 2 in 2005, and Unit 1 in 2008. Examinations have also identified set screw gaps, cracked set screw tack welds, and slip joint clamp wear. A root cause evaluation determined the cause to be inadequate margin in the original design. Corrective actions included installing slip joint clamps on all Unit 1 and Unit 2 jet pumps, installing auxiliary wedges on 7 Unit 1 jet pumps and 15 Unit 2 jet pumps, installing thicker and wider main wedges on 8 Unit 2 jet pumps, and restrainer bracket plates on 5 Unit 2 jet pumps.

This example provides objective evidence that the BWR Vessel Internals program implements examination requirements using the methods and examination frequency recommended in the appropriate BWRVIP guidelines. This example also illustrates that BWRVIP examinations performed by qualified personnel, are capable of detecting flaws and other indications of possible aging-related degradation of reactor vessel internal components. The example also demonstrates that identified deficiencies are entered into the corrective action program and appropriate actions are taken to evaluate and correct deficiencies.

5. Cracking has occurred in BWR steam dryer assemblies and support components due to IGSCC and fatigue as discussed in BWRVIP-139-A. Prior to 2005, examinations of the steam dryers were performed per General Electric SIL 474 and SIL 644 recommendations. On Unit 1, in 1996 a UT exam of the upper support ring identified several indications that were evaluated as acceptable for continued operation. In 1998, the uppermost strap was found broken during a VT-3 exam of a lifting rod. Evaluation resulted in removing a portion of the strap. In 2002, a VT-1 examination identified an indication in a drain channel weld that was evaluated as a fabrication deficiency and acceptable for continued operation. In 2004, 2006, 2008, and 2010, indications were identified during VT-3 exams of tie rod cam nut and washer tack welds. Evaluation resulted in implementing a modification to stake one cam nut to the tie rod end. Also in 2006 and 2008, VT-1 exam of the upper support ring identified several small indications suspected to be caused by IGSCC, which were evaluated as acceptable for continued operation. In 2008, a baseline VT-1 examination per BWRVIP-139-A identified an indication in a steam dryer hood seam weld. In 2010, wear was also identified on the steam dryer support ring seismic blocks by VT-1 examination. These conditions were evaluated as acceptable for continued operation.

On Unit 2, in 1995 a VT-3 exam of the overall dryer assembly identified an indication in the support ring that was evaluated as acceptable for operation. In 1997, a follow-up UT exam was performed to determine the crack depth and the condition was determined to be acceptable for continued operation. In 1999, VT-3 exam of the overall steam dryer assembly identified indications in the upper support ring that were evaluated as acceptable. These indications were re-examined in 2005 and 2007, and evaluated as acceptable. In 2007, baseline VT-1 examination per BWRVIP-139-A identified a crack in a steam dryer hood seam weld as acceptable for continued operation. In 2009, the indication was re-examined and determined to have increased by an acceptable amount.

This example provides objective evidence that the BWR Vessel Internals program implements examination requirements using the methods and examination frequency recommended in the appropriate BWRVIP guidelines. This example also illustrates that BWRVIP examinations performed by qualified personnel, are capable of detecting flaws and other indications of possible aging-related degradation of reactor vessel internal components. This example also demonstrates that deficiencies are entered into the corrective action program and appropriate actions are taken to evaluate deficiencies.

The operating experience of the BWR Vessel Internals program demonstrates that the program effectively implements the examination requirements in accordance with the methods and examination frequency recommended by the appropriate BWRVIP guidelines. The program has been continuously improved to implement recommendations from new or revised BWRVIP reports. These improvements have included improved examination methods and examination of additional components based on the operating experience from the entire international BWR fleet. Problems have been identified prior to impacting the safe operation of the plant, and adequate corrective actions have been taken to evaluate and correct the conditions as necessary. Appropriate guidance, based on recommendations within BWRVIP reports is applied for evaluation, repair, or replacement when degradation is identified. Periodic self-assessment of the BWR Vessel Internals program is performed to identify the areas that need improvement to maintain the quality performance of the program. Therefore, there is confidence that implementation of the enhanced BWR Vessel Internals program will effectively manage degradation of reactor vessel internal components prior to failure during the period of extended operation.

Conclusion

The enhanced BWR Vessel Internals program will provide reasonable assurance that cracking, loss of material and loss of fracture toughness 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) aging management program is an existing condition monitoring program that is 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 wall thinning in piping and fittings, valve bodies, and heat exchangers due to FAC in steam and treated water environments.

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 in piping and fittings, valve bodies, and feedwater heater shells. Program activities include analyses to determine critical locations, baseline inspections to determine the extent of thinning at these critical locations, and follow-up inspections to confirm the predictions. Inspections are performed using ultrasonic, visual or other approved testing techniques capable of detecting wall thinning. Repairs and replacements are performed as necessary.

Where applicable, analyses to determine critical locations in piping and other components susceptible to FAC is performed utilizing CHECWORKS, a predictive code that uses the implementation guidance of NSAC-202L-R3 to satisfy the criteria specified in 10 CFR Part 50, Appendix B for development of procedures and control of special processes. For each examined component, a verified and validated PC-based computer program, called FAC Manager, is utilized in conjunction with CHECWORKS to calculate component wear, wear rate, projected thickness, and remaining life. If a component’s remaining life cannot be demonstrated to be more than one operating cycle, then corrective action is required, such as repair, replacement, or reevaluation.

No preventive or mitigative attributes are directly associated with the FAC program. However, it is recognized that water chemistry monitoring to control pH and dissolved oxygen content is effective in reducing FAC. The program considers water treatment changes that may affect the FAC rates (e.g., water treatment amines, hydrogen water chemistry, hydrazine addition, or any other change that affects the pH or dissolved oxygen concentration).

The FAC program, which was originally outlined in NUREG-1344, is implemented as required by NRC Generic Letter 89-08, “Erosion/Corrosion-Induced Pipe Wall Thinning. As noted above, the FAC program is based on the EPRI guidelines in NSAC-202L-R3.

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.

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. In 2010, 102 inspections were completed on Unit 1. These inspections included large bore and small-bore piping and components and feedwater heater nozzles and shells. The majority of these inspections were re-inspections based on the results of previous inspections. Twenty additional inspections were completed as a result of inspections during the outage that required expanded scope or additional examinations. In addition, the outage included a planned scope of 442 feet of small bore and 74 feet of large bore replacement piping. All of this piping was replaced with FAC resistant material containing 1.25 percent chrome.

   When wall thickness was identified that was below the acceptable wall thickness, the piping was replaced and an expanded scope of inspections were identified. For example, inspection of the feedwater heater operating vent lines identified unacceptable results. An inspection of the operating vent line from the third feedwater heater to the condenser identified unacceptable wear at the nozzle connection to condenser. The area was repaired and additional inspections were performed.

2. In 2009, 83 inspections were completed on Unit 2. These inspections included large-bore and small-bore piping and components. In addition, eleven feedwater heater shell inspections were performed. During this outage, approximately 419 feet of piping was replaced with FAC resistant material containing 1.25 percent chrome. When wall thickness was identified that was below the acceptable wall thickness, an evaluation was performed to determine if the component is acceptable for continued operation. For example, an inspection of the third feedwater heater shell identified wall thickness that was lower than the minimum acceptable wall thickness but above the required code thickness. An evaluation was performed that found that the degraded condition was acceptable until the next outage (2011), at which time replacement is recommended. All three of the third feedwater heaters have been inspected starting in 2003. The other two third feedwater heaters were repaired in 2005 and 2007. In addition, all of the feedwater heater shells are included in a feedwater heater inspection plan.

3. In 2008, 62 inspections were completed on Unit 1. These inspections included large-bore and small-bore piping and components and feedwater heater nozzles and shells. In addition, 454 feet of small-bore piping was replaced with FAC resistant material containing 1.25 percent chrome. One feedwater heater shell had a scheduled repair based on previous inspection data.

4. In 2008, INPO released Operating Experience Digest OED 2008-02 to communicate recent industry events associated with low pressure feedwater heater shell leakage. In accordance with the Exelon process for evaluating industry experience, the questions and guidance of this document were evaluated for applicability to LGS. LGS has a feedwater heater shell inspection plan and has been examining the feedwater heater shells, tracking the inspection results, and performing repairs as necessary.

The operating experience of the Flow-Accelerated Corrosion program shows that the program effectively monitors and trends the aging effects of FAC on piping and components and takes appropriate corrective action prior to loss of intended function. Problems identified would not cause significant impact to the safe operation of the plant, and adequate corrective actions were taken. Appropriate guidance for re-evaluation, repair, or replacement is provided for locations where degradation is found. Assessments of the Flow-Accelerated Corrosion program are performed to identify the areas that need improvement to maintain the quality performance of the program. Therefore, there is confidence that continued implementation of the Flow-Accelerated Corrosion program will effectively identify degradation prior to failure.

Conclusion

The existing Flow-Accelerated Corrosion program provides reasonable assurance that wall thinning 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.2.1.11 Bolting Integrity

Program Description

The Bolting Integrity aging management program is an existing condition monitoring and preventive program that provides for aging management for loss of material and loss of preload of pressure retaining bolted joints within the scope of license renewal. The program includes bolting in air-indoor, air-outdoor, air-indoor with reactor coolant leakage, air/gas wetted, treated water, raw water, and soil environments. 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 TR-104213, "Bolted Joint Maintenance & Applications Guide," and EPRI NP 5769, "Degradation and Failure of Bolting in Nuclear Power Plants," as part of the comprehensive component pressure retaining bolting program. The program provides for managing loss of material and loss of preload by performing visual inspections for pressure retaining bolted joint leakage at least once per refueling cycle. Inspection activities for bolting in a submerged environment are performed in conjunction with associated component maintenance activities. Inspection activities for bolting in buried and underground applications is performed in conjunction with inspection activities for the Buried and Underground Piping and Tanks (B.2.1.29) program due to the restricted accessibility to these locations.

The ISI program plan tables provide the examination category and description as identified in ASME Section XI, Table IWB-2500-1 for Class 1 components, Table IWC-2500-1 for Class 2 components, and Table IWD-2500-1 for Class 3 components.

Examinations are currently performed in accordance with the ASME Section XI, 2001 Edition through the 2003 Addenda, per the ISI program plan. Examinations for the period of extended operation will be in accordance with the appropriate code edition and addenda for the ISI program plan. In accordance with 10 CFR 50.55a(g)(4)(ii), the program is updated each successive 120-month inspection interval to comply with the requirements of the latest edition of the ASME Code specified twelve months before the start of the inspection interval. The extent and schedule of the inspections is in accordance with IWB-2500-1, IWC-2500-1, and IWD-2500-1 and assures that detection of leakage or fastener degradation occurs prior to loss of system or component intended functions. Bolting associated with Class 1 vessel, valve and pump flanged joints receive visual (VT-1) inspection. For other pressure retaining bolting, routine observations identify any leakage before the leakage becomes excessive.

The integrity of non-ASME Class 1, 2, or 3 system and component bolted joints is evaluated by detection of visible leakage during maintenance or routine observation such as system walkdowns and inspections at least once per refueling cycle. Inspection activities for non-ASME Class 1, 2, or 3 bolting in a submerged environment are performed in conjunction with associated component maintenance activities.

The Corrective Action Program is used to document and manage those locations where leakage was identified during routine observations including engineering walkdowns and equipment maintenance activities. Based on the severity of the leak and the potential to impact plant operations, nuclear or industrial safety, a leak may be repaired immediately, scheduled for repair, or monitored for change. If the leak rate changes (increases, decreases, or stops), the monitoring frequency is re-evaluated and may be revised.

High strength bolts (actual yield strength ≥150 ksi) are not used on pressure retaining bolted joints within the scope of the Bolting Integrity aging management program.

Procurement controls and installation practices, defined in plant procedures, include preventive measures to ensure that only approved lubricants, sealants, and proper torque are applied. The activities are implemented through station procedures. Lubricants containing molybdenum disulfide are not used.

Other aging management programs also manage aging effects of bolting and supplement this bolting integrity program. The ASME Section XI Inservice Inspection (ISI) Subsections IWB, IWC, and IWD (B.2.1.1) program manages the aging effects of safety-related bolting and supplements this bolting integrity program. The ASME Section XI, Subsection IWF (B.2.1.32) program manages aging effects of ASME Class 1, 2, 3, and MC piping and component supports for license renewal. The ASME Section XI, Subsection IWE (B.2.1.30) program addresses aging management of containment pressure retaining bolting. Other structural bolting is managed as part of the Structures Monitoring (B.2.1.35) program and the R. G. 1.127 Inspection of Water Control Structures Associated With Nuclear Power Plants (B.2.1.36) program. The aging management of crane and hoist bolting is covered by the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.2.1.14) program. Aging management for the reactor head closure bolting is covered by the Reactor Head Closure Stud Bolting (B.2.1.3) program. Aging management of heating and ventilation bolted joints is covered by the External Surfaces Monitoring of Mechanical Components (B.2.1.25) program. Inspection activities for bolting in a soil environment or underground air environment with restricted access are performed in conjunction with buried piping and component inspections performed as part of the Buried and Underground Piping and Tanks (B.2.1.29) program. Inspections for loss of material are performed by the Buried and Underground Piping and Tanks program and inspections for loss of preload are performed by the Bolting Integrity program.

Class 1, 2, and 3 pressure retaining bolted joint repair falls within the scope of the ASME Section XI Repair and Replacement Program. Flanged joint welding repairs are implemented in accordance with IWA-4000. Pressure bolting replacements are implemented in accordance with IWA-7000. Other pressure retaining bolting maintenance evaluations and repairs follow the EPRI bolting guidelines for the evaluation and repair of the flanges and replacement bolts.

The ASME Section XI, Subsection IWF (B.2.1.32) program addresses replacement of NSSS component support bolting. Corrective actions are addressed in accordance with 10 CFR Part 50, Appendix B.

NUREG-1801 Consistency

The Bolting Integrity aging management program is an existing program that 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 components. **Program Elements Affected: Preventive Actions (Element 2), Detection of Aging Effects (Element 4), Corrective Actions (Element 7)**
2. Prohibit the use of lubricants containing molybdenum disulfide for closure bolting for pressure retaining components. **Program Element Affected: Preventive Actions (Element 2)**
3. Minimize the use of high strength bolting (actual measured yield strength equal to or greater than 150 ksi) for closure bolting for pressure retaining components. High strength bolting, if used, will be monitored for cracking. **Program Elements Affected: Preventive Actions (Element 2), Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4)**

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 February 2001, during a scheduled shutdown for a maintenance outage, a Unit 2 main steam relief valve actuated. Subsequent inspection revealed loose outlet flange bolting for the 2N relief valve. As-found torque checks of the outlet flange on the other relief valves revealed torque values less than expected. All fasteners were tightened to a higher torque value and staked. Inlet flange torque and gasket crush were determined to be acceptable. Unit 1 was intentionally shutdown to inspect the fasteners for the relief valves and conditions similar to Unit 2 were identified. The root cause analysis determined that the principal causes of this condition were less

than adequate specified torque and excessive gasket creep. The excessive gasket creep was related to a change in gasket material and type that exhibited more creep than the original asbestos filled gaskets. The spiral wound gasket was not fully crushed down to the outer ring and gasket creep caused a loss of fastener preload. With preload relieved, the fasteners on the actuated relief valve loosened due to the loads imposed by the valve actuation and vibration during blowdown. Corrective actions included installation of a more suitable gasket, review of similar gasket installations to determine if current applications were acceptable, enhancing the process for establishing and changing torque values, and improvements to maintenance guidance and training material for torquing mechanical joints. This event demonstrates that the corrective action program is effective in addressing bolting issues and that lessons learned are applied to similar installations throughout the plant.

2. In February 2005, during maintenance of the 2A reactor feed pump, removal of the thermal insulation identified one displaced nut and one loose nut from the pump suction flange. There were no signs of leakage from the flange joint. This joint is not normally disassembled for routine maintenance but was disassembled in a prior outage (1997) to search for potential foreign material from a piping modification. A review of the maintenance history for the pumps revealed that the flange for the 2B pump was also removed during the modification. Fasteners for the 2B pump suction flange were inspected and torque was verified to be acceptable for all fasteners. The cause of the loose bolting was attributed to the use of hydraulic torque wrenches with less than adequate training or torquing knowledge. A similar occurrence is documented in 1997 for loose bolting on an auxiliary steam pipe spectacle flange. Following that event, hands-on refresher training for maintenance personnel was conducted as well as performing a review of maintenance procedures that involve the torquing process. Additional training in the use of hydraulic torque wrenches was also performed in 2002 and 2005. This event demonstrates that corrective actions are effective to address knowledge gaps for appropriate use of hydraulic torque tooling.

3. On June 18, 2007, inspection identified one of the four bolts on the Unit 2 EDG oil cooler discharge pipe lower flange was loose. An immediate evaluation of the condition was performed concluding the diesel generator remained operable in this condition. On June 20, 2007, the loose bolt was tightened as required by design. This event demonstrates that appropriate actions are taken when degraded conditions are identified.

4. In December 2004 during routine operator rounds on Unit 1, it was discovered that a lockwasher was not fully compressed on a bolted flange in the electro-hydraulic control system piping. The joint consists of a four bolt arrangement with lockwashers. No leakage was observed and the other three bolts appeared to be tight. The fourth bolt with the lockwasher not fully compressed was challenged by the floor supervisor and confirmed to be loose. The loose bolt was immediately tightened to the proper torque and the remaining bolts were checked for proper torque. This event demonstrates that routine inspections and walkdowns are effective in

identifying bolting degradation and that effective corrective action is implemented.

5. In November 2008, a routine walkdown on Unit 1 by operations personnel identified a loose nut on the flange connecting the service water piping to the 1B recirculation pump MG set oil cooler. The nut was immediately hand tightened. Other nuts on both the 1A and 1B oil coolers were checked for tightness and no additional loose nuts were identified. The same day, maintenance re-torqued the loose nut and all other nuts were verified to be properly torqued. This event demonstrates the effectiveness of periodic inspections to identify degrading conditions and the effective use of the corrective action program.

The operating experience of the Bolting Integrity program demonstrates that the problems identified do not impact intended function, and adequate corrective actions are taken to prevent recurrence. Isolated cases of bolt corrosion, loss of bolt preload and bolt torquing issues have been experienced at LGS. In all cases, the existing inspection and testing methodologies have discovered the deficiencies and corrective actions were implemented prior to loss of system or component intended functions. Appropriate guidance for re-evaluation, repair, or replacement is provided for locations where degradation is found. Therefore, there is confidence that continued implementation of the Bolting Integrity program will effectively identify degradation prior to loss of intended function.

Conclusion

The enhanced Bolting Integrity program provides 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.2.1.12 Open-Cycle Cooling Water System

Program Description

The Open-Cycle Cooling Water System (OCCWS) aging management program is an existing program that includes mitigative, preventive, performance monitoring, and condition monitoring activities to manage heat exchangers, piping, piping elements, and piping components in safety-related and nonsafety-related raw water systems that are exposed to a raw water or air/gas wetted environment for loss of material, reduction of heat transfer, and hardening and loss of strength of elastomers. The activities for this program are consistent with the LGS 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 (i. e. Radiographic Testing, Ultrasonic Testing, and Eddy Current Testing), and biocide and chemical treatment are conducted to ensure that aging effects are managed such that system and component intended functions and integrity are maintained.

The OCCWS includes those systems that transfer heat from safety-related systems 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 spatial interaction but have no safety-related heat transfer function.

The guidelines of GL 89-13 are utilized for the surveillance and control of biofouling for the OCCWS. Procedures provide instructions and controls for chemical and biocide injection. Periodic inspections are performed for the presence of mollusks and biocide treatments are applied as necessary.

Periodic heat transfer testing or inspection and cleaning of heat exchangers with a heat transfer intended function is performed in accordance with LGS commitments to GL 89-13 to verify heat transfer capabilities. Periodic inspection and cleaning is performed on the heat exchangers without a heat transfer intended function.

Routine inspections and maintenance ensure that corrosion, erosion, sediment deposition and biofouling cannot degrade the performance of safety-related systems serviced by OCCWS. No credit is taken for protective coatings on safety-related components in the OCCWS. Protective coatings on the Circulating Water System piping are periodically inspected and repaired. The In-service Inspection (ISI) program provides for periodic leakage detection of buried piping and components as well as inspection of aboveground piping and components.

Examination of polymeric materials in systems serviced by OCCWS will be consistent with examinations described in the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) program.

System walkdowns are performed periodically to assess the material condition of OCCWS piping and components. Compliance with the licensing basis is ensured by review of system design basis documents as well as periodic performance of focused area self-assessments and safety system functional inspections.

Enhancements to the program, including internal inspections of buried pipe and periodic inspection of the Nonsafety-Related Service Water System piping will be implemented prior to entering the period of extended operation.

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.

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 internal inspection of buried Safety Related Service Water Piping when it is accessible during maintenance and repair activities. **Program Elements Affected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4)**

2. Perform periodic inspections for loss of material in the Nonsafety-Related Service Water System at a frequency in accordance with NRC Generic Letter 89-13. **Program Elements Affected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4)**

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 function are maintained consistent with the current licensing basis during the period of extended operation:

1. Periodic non-destructive examinations of the Safety Related Service Water System (RHRSW) identified three non-through wall localized thinned areas on the 30-inch diameter RHRSW cross-tie piping. This section of piping is normally isolated from the remainder of the RHRSW return loops. The nondestructive examination (NDE) was being performed to complete the augmented inspections required by ASME Code Case N-513, "Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping, Section XI, Division 1," for another RHRSW piping flaw location. The identified flaws did not involve a pressure boundary breach or system leakage. The flaws were evaluated using the ASME code case methodology and it was determined that the piping at these locations met the applicable design criteria for operability and the piping would have been able to perform its intended function. Work orders were initiated to re-inspect the thinned locations on a 30-day interval, to establish a material loss rate, until repairs could be made. In addition, an administrative clearance was applied to the piping to maintain this section of cross-tie piping in a depressurized condition. As a result of the inspection, additional locations were selected for augmented wall thickness measurements. This demonstrates the effectiveness of the periodic piping NDE in identifying degraded piping prior to loss of intended function and taking appropriate action in the Corrective Action Program.

2. Once per year the Spray Pond and Cooling Towers are inspected for clams and mollusks. The inspection performed in November 2009 identified one live Asiatic clam from the composite of nine bottom sludge samples from the Spray Pond. No other clams or mussels were identified from the Spray Pond perimeter inspection. Although the Schuylkill River is known to contain Asiatic clams, this is the first time that a live clam was captured in the bottom sludge. Corrective action was to apply a clam control chemical treatment to the Spray Pond and notify personnel involved in the inspection of heat exchangers serviced by raw water systems that a clam had been discovered at LGS. This event demonstrates the effectiveness of the program to survey the OCCWS for evidence of mollusks and initiate actions to control the mollusk population.

3. An evaluation was performed in August 2002 to address multiple Emergency Service Water (ESW) leaks that had occurred on the Unit 1 and Unit 2 ESW piping systems. A total of 24 leaks had been identified on ESW piping from 1989 to 2002 and the rate at which the leaks were occurring was increasing. The review concluded that the majority of leaks occurred in the small diameter piping in the supply and return lines to Residual Heat Removal (RHR) and High Pressure Coolant Injection (HPCI) room coolers and lines subject to intermittent low flow. The evaluations concluded that initial ESW operation with untreated water established significant corrosion with accumulation of silt and corrosion product sediment. The current water chemistry was determined to be appropriate for carbon steel piping but no chemical treatment was capable of reaching the active corrosion cells under the deposits of corrosion products, silt, and tubercules. The evaluation provided the basis to proceed with replacement of the most susceptible portions of the carbon steel piping with stainless steel materials, adjustments to chemistry sampling, and to avoid over chlorination of raw water. This example provides objective evidence that this program trends system and component degradation and implements corrective actions to prevent the loss of intended functions.

4. The Unit 2 2B-E205 Residual Heat Removal (RHR) heat exchanger tube (304L stainless steel) inspection was performed during the spring 2003 refueling outage as part of the routine safety-related heat exchanger cleaning and examination. Thirty percent of the tubes were scheduled for eddy-current examination. Initial inspection results indicated extensive tube internal diameter pitting, with the majority of pitting occurring at the upper end of the straight section and through the U-bend area. This finding was immediately entered into the Corrective Action Program. As a result, the inspection scope was expanded to include all of the tubes for the 2B heat exchanger. A tube section was extracted for laboratory analysis confirming the extent of the pitting and contributing to the identification of the root cause for the pitting. As a result of this degraded condition, evaluations were performed to confirm that the heat exchanger would be able to perform its intended function with an extensive number of plugged tubes, electro-chemical potential probes were installed to monitor the effectiveness of heat exchanger lay-up, and cleaning and inspection were scheduled more frequently, including the next refueling outage. Inspection of the 2A heat exchanger, also containing 304L stainless steel tubes, was advanced to the next refuel outage in 2005. The heat exchanger was returned to service with 94 plugged tubes. Inspection results from 2005 for the 2A heat exchanger did not reveal any significant pitting and the 2B results did not indicate any significant pit growth. The 2B heat exchanger is scheduled for replacement in the Unit 2 spring 2011 refueling outage with AL6XN tube material. This event demonstrates that the use of GL 89-13 guidelines for heat exchangers is effective in identifying degrading conditions before loss of intended function and that the Corrective Action Program is utilized to evaluate degraded conditions and implement corrective actions to maintain component performance.

5. The Spray Pond chemistry monitoring program requires a determination of mild steel corrosion rate. On July 2003, analysis of a surface sample of spray pond water determined that the measured mild steel corrosion rate exceeded the expected range by the plant chemistry procedure. At that time, the spray pond treatment program required the addition of Depositrol BL5307, which is designed to prevent calcium carbonate scale formation on heat exchanger surfaces as well as act as a mild steel corrosion inhibitor. The elevated corrosion rate was determined to be a long term concern and was caused by high ambient temperatures coupled with low chemical concentration. The addition of Depositrol BL5307 was performed to return the measured mild steel corrosion rate to an acceptable range. This demonstrates the effectiveness of the water chemistry monitoring program to minimize corrosion of system components.

The operating experience of the Open-Cycle Cooling Water System program did not show any 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. Appropriate guidance for re-evaluation, repair, or replacement is provided for locations where degradation is found. Assessments of the Open-Cycle Cooling Water System program are performed to identify the areas that need improvement to maintain the quality performance of the program. Therefore, there is confidence that continued implementation of the Open-Cycle Cooling Water System program will effectively identify degradation prior to loss of system and component intended functions.

Conclusion

The enhanced Open-Cycle Cooling Water System 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.2.1.13 Closed Treated Water Systems

Program Description

The Closed Treated Water Systems program is an existing mitigation program that includes (a) nitrite-based water treatment, including pH control and the use of corrosion inhibitors for carbon steel and copper alloys, 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; and (b) chemical testing of the water to ensure that the water treatment program maintains the water chemistry within acceptable guidelines. The Closed Treated Water Systems program manages the loss of material and the reduction of heat transfer in piping, piping components, piping elements, tanks, and heat exchangers exposed to a closed treated water environment.

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.

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 and performance monitoring, including periodic testing and opportunistic and periodic NDE to verify the effectiveness of water chemistry control at mitigating aging effects. A representative sample of piping and components will be selected based on likelihood of corrosion and inspected at an interval not to exceed once in 10 years during the period of extended operation. **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 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 November 2009, an increasing trend in Unit 1 Turbine Enclosure Cooling Water (TECW) system nitrate concentration was identified. There are no goals or thresholds for nitrate level which is a diagnostic parameter used to detect adverse trends and assist in problem diagnosis. An increase in nitrate can be an indication of air inleakage. Upon investigation, no abnormal indication of inleakage was identified. An evaluation was completed which concluded that this increasing nitrate trend did not adversely affect the TECW system at that time and that the chemistry controls in place, including the continued monitoring of control parameters and diagnostic parameters, ensure the long term health of the TECW system. This example provides objective evidence that a) adverse trends found during chemistry monitoring activities are documented in the corrective action program, b) investigations are performed to identify the cause of the adverse trend, and c) evaluations are performed to assess the consequences of the adverse trend to ensure that system intended functions are maintained.

2. In January 2009, an increasing trend in the number of chemical additions required to maintain the Unit 1 TECW system in spec was identified. Initially it was believed to have been the result of increased air inleakage. Upon further investigation of the chemistry trends, it was identified that the increase in chemical consumption applied not only to nitrite but also to TTA. Air inleakage could explain the increase in the consumption of nitrite as it is oxidized to nitrate; however, TTA is a stable organic film-forming chemical which does not degrade in the presence of oxygen. Since both parameters were decreasing at a comparable rate, air inleakage was determined to not be the likely cause. Instead, it was concluded that TECW system leakage was the cause. Troubleshooting was then turned over to the system manager for resolution. This example provides objective evidence that a) adverse trends found during chemistry monitoring activities are documented in the corrective action program, b) investigations are performed to identify the cause of the adverse trend, and c) corrective actions are initiated to ensure that system intended functions are maintained.

3. In November 2007, it was identified that the "B" loop of the Control Enclosure Chilled Water (CECW) system had both nitrite and TTA concentrations within goal but towards the low end of the desired concentration range. The normal course of action would be to make a chemical addition to raise the concentrations to the desired target. The two chemicals normally added to raise the concentration of nitrite and TTA also cause the system pH to increase. The system pH was at the time 10.37 and there is an upper goal for pH to be less than or equal to 10.5. Adding the two chemicals to raise the concentration would cause the system pH to be above goal. An alternative chemical to raise nitrite concentration existed that had no affect on pH; however, to raise the nitrite concentration to the desired target would require adding 5200 grams of sodium nitrite which appeared to be a large quantity. The chemical added to raise the TTA concentration has a pH of 13. The volume required to be added to raise the TTA concentration to the desired target was determine to be insufficient to cause the system pH to exceed 10.5 since only 722 ml was required. It was also feasible to raise the concentration of TTA to a lower value than that specified in the chemical addition procedure to minimize the system impact. An Issue Report was written to document the condition and to request a plan to increase the nitrite and TTA concentration to a more acceptable value without exceeding the system pH goal. This example provides objective evidence that a) adverse trends found during chemistry monitoring activities are documented in the corrective action program, and b) corrective actions are initiated to ensure that system intended functions are maintained.

4. In July 2010, performance monitoring data on the Emergency Diesel Generator (EDG) data collected during the surveillance run identified that the jacket water temperature differential was negative. The negative temperature differential indicates that heat was being added to the jacket water as it is passed through the jacket water heat exchanger. The function of the jacket water heat exchanger is to maintain the jacket water within the expected range. The review of data from the test indicated that the temperature was still maintained within the expected range and that there was no adverse affects on engine performance.

   The jacket water is cooled in the jacket water heat exchanger via the Emergency Service Water (ESW) system. It was determined that the ESW gained heat from the upstream EDG lube oil and air cooler coolant heat exchangers, reaching the jacket water heat exchanger at a temperature that was close to or hotter than the jacket water temperature. This condition was entered into the corrective action program. An Issue Report was created to identify the performance monitoring data and also to track and trend any adverse trends in heat transfer to the jacket water heat exchanger. This example provides objective evidence that a) adverse conditions identified during performance monitoring activities are documented in the corrective action program, and b) adverse conditions identified during performance monitoring activities are trended and evaluated to assess their impact on system intended functions.

The above examples provide objective evidence that the existing 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. 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 effects of loss of material in air-indoor and treated water environments 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 scope of cranes, hoists, rigging beams and monorails within the scope of license renewal that handle heavy loads is based on LGS site-specific analysis M-038-00008, "Overhead Handling Systems Review," an analysis of all overhead handling systems that evaluates and documents compliance with NUREG-0612. Overhead lifting equipment that operates over safety-related equipment, or has safety-related equipment beneath the load path on the next lower building elevation, are included within the scope of license renewal. Also within the scope of license renewal are those light load equipment handling systems related to refueling operations that are used to handle fuel or equipment within or above the spent fuel pool or the reactor cavity. As a result of this review, approximately 80 cranes, hoists, rigging beams, monorails, and the refueling platforms and associated fuel and equipment handling equipment are within the scope of license renewal and are managed by the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program.

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, annual periodic inspections may be deferred until just prior to use.

The program will be enhanced to include annual 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, and to consistently 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. The program will also be enhanced to include direction to evaluate loss of material due to wear or corrosion and any loss of bolting preload on cranes, hoists, and equipment handling systems, and to perform any repair activity per the appropriate ASME B30 series standard.

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 enhancements will be implemented in the following program elements:

1. Perform annual periodic inspections as defined in the appropriate ASME B30 series standard for all cranes, hoists, and equipment handling systems within the scope of license renewal. For handling systems that are infrequently in service, such as those only used during refueling outages, annual periodic inspections may be deferred until just prior to use. **Program Elements Affected: Scope of Program (Element 1) and Detection of Aging Effects (Element 4)**

2. Perform inspections 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. **Program Elements Affected: Scope of Program (Element 1), Parameters Monitored/Inspected (Element 3) and Detection of Aging Effects (Element 4)**

3. Evaluate loss of material due to wear or corrosion and any loss of bolting preload on cranes, hoists, and equipment handling systems per the appropriate ASME B30 series standard. **Program Element Affected: Acceptance Criteria (Element 6)**

4. Perform repairs to cranes, hoists, and equipment handling systems per the appropriate ASME B30 series standard. **Program Element Affected: Corrective Actions (Element 7)**

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 continue to be effective in assuring that intended function are maintained consistent with the current licensing basis during the period of extended operation:

1. Wear was identified in March 2008 on the Unit 1 refueling platform main trolley rail causing minor binding of the trolley during movement. Further investigation in October 2008 identified that the trolley was not mounted in

a plumb condition, which may have contributed to the wear condition. Corrective actions included maintenance to repair the trolley alignment and included revision to procedures to periodically inspect, clean and lubricate the trolley rails on both units refueling platforms. This condition is being monitored by the system manager to determine whether additional corrective actions are necessary.

This example provides objective evidence that the LGS inspection, maintenance and corrective action programs are effective in identifying minor degraded conditions caused by aging effects and implementing corrective actions to prevent further degradation prior to the condition becoming significant, potentially impacting the intended function.

2. Paint was identified as chipping and peeling from the Unit 1 and Unit 2 refueling platforms in December 2003. In December 2009, the periodic inspection of the refueling platform identified additional paint peeling and chipping on the Unit 1 refueling platform. This condition has not resulted in structural degradation, and is being monitored by the system manager to determine whether re-painting is necessary.

   This example provides objective evidence that the periodic inspections of crane and hoist structural components being performed to meet ASME B30 standards are effective in identifying and trending minor degradation to material condition prior to loss of function. Painting degradation could be a precursor to loss of material due to corrosion.

3. While performing the periodic inspection of the reactor enclosure overhead crane in August 2006, it appeared that a retaining nut on the main hoist hook block was cracked, and a corrective action program issue report was initiated to investigate. Further inspection identified that only the coating on main hoist hook block was degraded, and the nut was in acceptable condition. Corrective action included repainting the hook block.

   This example provides objective evidence that the periodic inspections of crane and hoist structural components being performed to meet ASME B30 standards are effective in identifying minor degradation to material condition prior to loss of function. Painting degradation could be a precursor to loss of material due to corrosion. This example also demonstrates that station personnel that perform period inspections effectively use the corrective action program to document low-level material condition issues that may require additional investigation or corrective actions.

4. A review of over 600 LGS corrective action reports since 2000 did not identify any history of significant loss of material due to corrosion in cranes and hoists structural members, loss of material due to wear in the rail system or loss of preload of associated bolting. Almost all of the cranes, hoists, rigging beams, monorails, and refueling platforms and associated fuel and equipment handling equipment within the scope of license renewal are within the current periodic inspection program described within the ASME B30 series of standards for overhead material handling equipment. Periodic inspections of the passive structural components to be inspected under the program have been performed for several years with no reported

indication of significant loss of material due to corrosion or wear, or loss of preload of associated bolting.

This example provides objective evidence that the material condition of the cranes, hoists, rigging beams, monorails, and refueling platforms and associated fuel and equipment handling equipment within the scope of license renewal are being maintained in good material condition. Also, the periodic inspection program has been effective in monitoring the condition of the equipment and identifying low-level material condition issues prior to challenging the intended functions.

The operating experience of the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems 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 correct or trend the condition. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is identified. Therefore, there is confidence that continued implementation of the 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.

Conclusion

The enhanced Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program will provide reasonable assurance that aging effects of loss of material and loss of preload 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 program that manages piping, piping components, piping elements, and valve bodies for loss of material in air and gas environments in the Compressed Air, Primary Containment Instrument Gas, and Traversing Incore Probe Systems. Program activities consist of air quality monitoring and trending, preventive maintenance, and condition monitoring measures to manage the effects of aging.

The Compressed Air Monitoring program is based on the LGS response to NRC Generic letter 88-14, "Instrument Air Supply Problems" and utilizes guidance and standards provided in INPO SOER 88-01. The Compressed Air Monitoring program activities implement the moisture and contaminant criteria of ANSI MC11.1 (ISA S7.3, incorporated into ANSI/ISA-S7.0.01). Program activities include air quality checks at various locations to ensure that dew point, particulates, lubricant content, and contaminants are maintained within the specified limits.

The program includes testing and inspection of the systems within the scope of license renewal. The effects of corrosion and presence of contaminants are detected during system manager walkdowns, weekly surveillances, and preventive maintenance inspections of compressors, filters, accumulators, receivers, and drain traps. The procedures and work orders for these inspections include specific performance criteria. 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. Evaluations are performed for test or inspection results that do not satisfy established criteria and an Issue Report (IR) is initiated to document the concern. 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 LGS 10 CFR Part 50, Appendix B quality assurance program.

NUREG-1801 Consistency

The Compressed Air Monitoring aging management program is consistent with the ten elements of aging management program XI.M24, “Compressed Air Monitoring,” specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The following examples of operating experience provide objective evidence that the Compressed Air Monitoring 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 February 2002, while performing a weekly surveillance on a Unit 1 moisture element vent valve, a low dew point alarm was received in the main control room. After the surveillance and closure of the vent valve, the alarm cleared. However, an issue report was generated following receipt of the alarm. As part of troubleshooting and investigation, a replacement moisture monitoring instrument was obtained and installed. During the shift following installation, multiple low dew point alarms were received and the dryer component continued to be monitored closely. During the subsequent monitoring the trend of dew point continued to improve, and the alarms cleared. Dew point was confirmed to be maintaining a value in the acceptable range. This example provides objective evidence that discrepancies are documented in the corrective action program, that weekly surveillance testing identifies conditions potentially adverse to proper system operation, and that evaluations and repair are performed in order to maintain intended functions.

2. In February 2007, carbon steel drain lines from the back-up service air compressor were identified to be in a rusted condition near their termination point. Although some of the lines were rusted extensively, the upstream valves relied on for system leaktightness were not degraded. However, evaluation determined that continued degradation of the drain lines was not acceptable, and the lines were scheduled for replacement with stainless steel lines. Replacement of the lines was subsequently completed. This example provides objective evidence that discrepancies are documented in the corrective action program, engineering review is performed to determine appropriate response, and that evaluations and repair are performed in order to maintain intended functions.

3. In November 2005, the 2A instrument air compressor was noted to be making a noise that did not sound typical. While the unit was operating within parameters, it was noted that intercooler pressure appeared to be fluctuating. The observer determined that the noise could be sourced from a chattering unloader valve, and generated an issue report for followup investigation. The investigation determined that the recently performed surveillance capacity test was completed satisfactorily for the unit, but also confirmed that the unloader valve was chattering. The unit continued to function within parameters, but it was placed on an increased surveillance frequency as a precaution, and the condition was corrected during the following annual minor overhaul. This example provides objective evidence that discrepancies are documented in the corrective action program, that engineering review is performed to determine appropriate action, that appropriate compensatory measures are recommended to assure continued component operability, and that repair is performed to maintain intended functions.

4. In June 2006, nuclear oversight performed an assessment of the scheduled maintenance activities package for the 1B instrument air compressor overhaul and aftercooler cleaning and inspection. Several paperwork discrepancies were identified to the work group for discussion and correction. During performance of the maintenance activities, the oversight noted potential for improvement in safety and protection for both personnel and equipment. Actions were created to incorporate the improvements in future maintenance packages. This example provides objective evidence that potential discrepancies are identified in the corrective action program, and that process improvements are evaluated and implemented to maintain intended functions.

The operating experience of the Compressed Air Monitoring program did not show any significant age-related deficiencies. Problems identified would not cause significant impact to the safe operation of the plant, and adequate corrective actions were taken to prevent recurrence. Appropriate guidance for re-evaluation, repair, or replacement is provided for locations where degradation is found. Periodic self-assessments of the Compressed Air Monitoring program are performed to identify the areas that need improvement to maintain the quality performance of the program. Therefore, there is confidence that continued implementation of the Compressed Air Monitoring program will effectively identify degradation prior to failure.

Conclusion

The existing Compressed Air Monitoring program provides 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.2.1.16 BWR Reactor Water Cleanup System

Program Description

The BWR Reactor Water Cleanup System program is an existing condition monitoring and mitigation program that describes the requirements for augmented inservice inspection (ISI) for stress corrosion cracking (SCC) or intergranular stress corrosion cracking (IGSCC) on stainless steel Reactor Water Cleanup (RWCU) System piping welds outboard of the second (outboard) primary containment isolation valves. The program includes the measures delineated in NUREG-0313, Revision 2, and in NRC Generic Letter (GL) 88-01 and its Supplement 1. The program is implemented in conjunction with the Water Chemistry (B.2.1.2) program to minimize the potential of cracking due to SCC or IGSCC in a treated water environment. The BWR Reactor Water Cleanup System program activities, and the control of reactor water chemistry, manage the aging effects in stainless steel RWCU System piping welds outboard of the second primary containment isolation valves thereby maintaining the intended function of this piping.

The BWR Reactor Water Cleanup System program includes acceptable inspection alternatives to staff positions delineated in GL 88-01 as described in GL 88-01, Supplement 1. In accordance with the staff's criteria regarding the acceptable inspection schedules for the portion of the RWCU System piping welds outboard of the second primary containment isolation valves, the NRC has approved the elimination of the requirements to perform examinations of the outboard portion of the RWCU System for both LGS Unit 1 and Unit 2. If one or more of the RWCU System welds inboard of the primary containment isolation valves inspected as part of the on-going GL 88-01 inspections under the BWR Stress Corrosion Cracking (B.2.1.7) program have confirmed IGSCC or SCC indications, then an additional sample of RWCU System welds outboard of the primary containment isolation valves is selected and examined based on the requirements of GL 88-01.

NUREG-1801 Consistency

The BWR Reactor Water Cleanup System program is consistent with the ten elements of aging management program XI.M25, “BWR Reactor Water Cleanup System,” 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 Reactor Water Cleanup 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 accordance with Generic Letter (GL) 88-01, Supplement 1, upgrades and enhancements have been implemented to the Unit 1 and Unit 2 RWCU isolation valves in accordance with Generic Letter 89-10 to ensure that the valves will produce sufficient thrust to perform their design basis function, which is the isolation of containment in the event of a pipe break downstream of the valves.

2. Unit 1: Based on the satisfactory completion of all Generic Letter 89-10 required actions, no IGSCC detected in RWCU System piping welds inboard of the second primary containment isolation valves (previous and on-going GL 88-01 Inspections), and no IGSCC detected in RWCU System piping welds outboard of the second primary containment isolation valves after inspecting a minimum of 10 percent of the susceptible welds, no inspection of the outboard RWCU System piping is required.

3. Unit 2: Based on the satisfactory completion of all Generic Letter 89-10 required actions and the use of IGSCC-resistant piping materials, no inspection of the outboard RWCU System piping is required.

4. Since the issuance of GL 88-01, LGS has implemented improved chemistry standards, Hydrogen Water Chemistry, and Noble Metals Chemical Addition. These preventive actions reduce the susceptibility of the RWCU System piping outboard of the primary containment isolation valves to IGSCC or SCC. The effect of HWC and NMCA implementation to reduce the susceptibility to IGSCC or SCC is discussed in the Water Chemistry (B.2.1.2) program.

The operating experience of the BWR Reactor Water Cleanup System program did not show any adverse trend in performance. Ongoing GL 88-01 inspections of RWCU system welds inboard of the outboard RWCU System containment isolation valves under the BWR Stress Corrosion Cracking (B.2.1.7) program have not identified IGSCC or SCC in RWCU System welds. Therefore, there is confidence that continued implementation of the BWR Reactor Water Cleanup System program will effectively manage IGSCC or SCC in RWCU System piping welds outboard of the second primary containment isolation valves and identify degradation mechanisms prior to failure.

Conclusion

The existing BWR Reactor Water Cleanup System program provides reasonable assurance that cracking due to IGSCC or SCC 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 Protection

Program Description

The Fire Protection program is an existing program that manages the identified aging effects for the fire barriers and the halon and carbon dioxide systems and associated components 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 environments for fire protection components are: air-indoor (uncontrolled) and air-outdoor.

The Fire Protection program is a condition and performance monitoring program whose 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 provides for visual inspections of fire barrier penetration seals for signs of degradation such as loss of material, cracking, and hardening and loss of strength, through periodic inspection and functional testing. The program requires performance of visual inspections of not less than 10 percent of each type of penetration seal (except internal conduit seals which are not accessible for visual inspection) 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 and functional tests are used to manage the aging effects of fire doors and dampers. 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 6 months. Fire dampers shall be verified to be functional by visual inspection at least once per 24 months. In addition, a 10 percent sample of fire dampers shall be functionally tested at least once per 24 months.

The program also provides for aging management of external surfaces of the halon and carbon dioxide fire suppression system components through periodic functional tests and visual inspections for any 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. Provide additional inspection guidance to identify degradation of fire barrier walls, ceilings, and floors for aging effects such as cracking, spalling and loss of material. **Program Elements Affected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5), Acceptance Criteria (Element 6).**

2. Provide additional inspection guidance for identification of excessive loss of material due to corrosion on the external surfaces of the halon and carbon dioxide systems. **Program Elements Affected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5), 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 function and are maintained consistent with the current licensing basis during the period of extended operation:

1. During a walkdown of fire areas by the fire protection program engineer in 2007, a gouge was discovered in the foam of a fire penetration seal common to Unit 1 and Unit 2. The gouge resulted in a seal thickness at the location of the gouge less than the specified overall seal design thickness for the penetration. Further inspection of the area (cable spreading room) resulted in detection of damage to another foam penetration seal. The seals were declared inoperable pending an engineering evaluation, and issue reports were created to document evaluation of their condition and tracking of resolution. A preliminary evaluation determined the seals were capable of performing their intended function even in their degraded condition; however, repairs were scheduled and performed to restore the seals to their original design specification. The repairs to both seals were completed in 2007. This example provides objective evidence that routine inspection walkdowns are capable of discovering seal conditions contrary to specification, that conditions are evaluated for acceptability, that conditions not meeting design specifications are repaired, and that

conditions are entered, evaluated, and tracked in accordance with the corrective action program.

2. During routine inspection activities in 2004, two tears were discovered in the fabric covering of a Unit 2 seal between the floor and the outside surface of the containment wall. The tears were determined to be approximately 2 inches long. The condition was documented in an issue report for evaluation. The evaluation determined that the tears were located in the fabric covering over a ceramic fiber blanket located beneath the fabric. The fabric's function is to maintain the shape of the ceramic fiber blanket, which provides the fire barrier function. The discovered tears were bounded in size by an evaluation performed previously on larger tears in the covering fabric. Since the discovered tears were bounded in size by the previous evaluation, and did not result in a reduction in ability of the underlying ceramic blanket to perform its intended fire barrier function, it was determined that the fire barrier function was not compromised. The results were documented in the issue report. This example provides objective evidence that discrepancies are documented in the corrective action program, and that evaluations are performed in order to determine that component intended functions are maintained.

3. During an inspection in 2008, a Unit 2 Technical Requirements Manual fire door was found not to have an Underwriters Laboratories (UL) identification plate affixed indicating the door was a listed product. Fire doors should have identification that they are UL-listed items to provide evidence that they are properly specified for their fire barrier intended function. It appeared that an identification plate had once been attached. An extent of condition walkdown of all cable spreading room doors was immediately conducted and determined that all remaining doors were properly identified with the UL plate. The condition was entered into the corrective action program for evaluation. An engineering review was performed and confirmed that the subject door was indeed specified and procured correctly as a UL-listed door, and that no subsequent changes had been made to the door that would prevent its performing its intended fire barrier function. A placard was made and affixed to the door referencing the engineering evaluation for documentation purposes. This example provides objective evidence that the program’s surveillance activities identify potential degradation, discrepancies are entered into the corrective action program, and that evaluations and repair are performed in order to maintain component intended functions.

4. During performance of a scheduled system alignment verification in 2002, a Unit 1 main system halon supply bottle was found to not meet the required pressure. The bottle had undergone successful pressure testing per a scheduled surveillance 18 days prior to the discovery. A fire watch was established per procedure, and the backup halon system was verified to be aligned. The main bottle was subsequently repaired and aligned for duty. An issue report was generated for documentation and evaluation of the situation. The apparent cause evaluation identified potential causes as leaking external fittings (evaluated per procedure during the scheduled surveillance and again upon discovery of the low pressure bottle with no leaks apparent), and a leaking internal bottle valve. A corrective action was made to include the evaluation report in future work packages to highlight the potential for internal valve leakage and verification of leak tightness. This example provides objective evidence that discrepancies are documented in the corrective action program, that compensatory measures are taken per the program, that evaluations and repair are performed in order to maintain component intended functions, and that operating experience is used to augment preparation of work packages.

The operating experience of the Fire Protection program did not show any significant age-related deficiencies. Problems identified would not cause significant impact to the safe operation of the plant, and adequate corrective actions were taken to prevent recurrence. Appropriate guidance for re-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. Therefore, there is confidence that continued implementation of the Fire Protection program will effectively identify degradation prior to failure.

Conclusion

The enhanced Fire Protection program will provide reasonable assurance that the identified aging effects of loss of material, cracking, and hardening and loss of strength 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 Fire Water System

Program Description

The Fire Water System program is an existing program that manages identified aging effects for the water-based fire protection system and associated components, through the use of periodic inspections, monitoring, and performance testing. The program provides for preventive measures and inspection activities to detect loss of material prior to loss of intended functions. System functional tests, flow tests, flushes and inspections are performed in accordance with the applicable guidance from National Fire Protection Association (NFPA) codes and standards. The program applies to water-based fire protection systems that consist of sprinklers, nozzles, valves, hydrants, hose stations, standpipes, water storage tanks, and aboveground and underground piping and components. The environments managed by the program for fire components are air-outdoor and raw water. Fire system main header flow tests, sprinkler system inspections, visual yard hydrant inspections, fire hydrant hose inspections, hydrostatic tests, gasket inspections, volumetric inspections, and fire hydrant flow tests and pump capacity tests are performed periodically assure that aging effects are managed such that the system intended functions are maintained. 50-year sprinkler head testing will be conducted using the guidance provided in NFPA 25. Performance of the initial 50-year tests will be determined based on the date of the sprinkler system installation. Subsequent inspections will be performed every 10 years after the initial 50-year testing.

Selected portions of the fire protection system piping located aboveground and exposed to water will be inspected by non-intrusive volumetric examinations, to ensure that aging effects are managed and that wall thickness is within acceptable limits. The initial wall thickness inspections will be performed before the end of the current operating term and thereafter at a frequency of at least once every 10 years during the period of extended operation. These inspections will be capable of evaluating (1) wall thickness to ensure against catastrophic failure and (2) the inner diameter of the piping as it applies to the flow requirements of the fire protection system.

The backup fire water storage tank internal and external surfaces are inspected and volumetric examinations of the tank bottom are performed as described in the Aboveground Metallic Tanks (B.2.1.19) program. External surfaces of buried fire main piping are evaluated as described in the Buried and Underground Piping and Tanks (B.2.1.29) program.

The fire water system is maintained at the required normal operating pressure and monitored such that a loss of system pressure is immediately detected and corrective actions initiated. The program ensures that testing and inspection activities have been performed and the results have been documented and reviewed by the Fire Protection system manager for analysis and trending.

The system flow testing, visual inspections and volumetric inspections assure that aging effects are managed such that the system intended functions are maintained.

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.

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. Replace sprinkler heads or perform 50-year sprinkler head testing using the guidance of NFPA 25 "Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems" (2002 Edition), Section 5.3.1.1.1. This testing will be performed by the 50-year in-service date and every 10 years thereafter. **Program Elements Affected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4).**

2. Inspect selected portions of the water based fire protection system piping located aboveground and exposed to the fire water internal environment by non-intrusive volumetric examinations. These inspections shall be performed prior to the period of extended operation and will be performed every 10 years thereafter. **Program Elements Affected: Preventative Actions (Element 2), Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5), Acceptance Criteria (Element 6).**

Operating Experience

The Fire Water System tests and procedures that are performed at the plant are based on NFPA standards to ensure that the system and fire components will have reliable performance when required to function. The following examples of operating experience provide objective evidence that the Fire Water System 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 2005, during performance of the preventive maintenance (PM) activity on the unit-common fire system foam tank, issues were identified for improved performance of this task on subsequent occasions. Vendors had previously been used to accomplish this activity; however, site maintenance had taken over responsibility for its performance. Lessons learned included an inadequate amount of foam chemical having been ordered (previously the vendor had supplemented the quantity of foam for the activity), duration of the cleaning activity having been underestimated (resulting in an unplanned NEIL notification for system out-of-service as per procedure), and clearance tagging issues. All the emergent issues were addressed during the performance of the task; however, the library copy of the PM task was revised to address each of the issues to assure improved performance during subsequent activities. This example provides objective evidence that discrepancies are identified in the corrective action program, that compensatory measures are taken according to the program, and that operating experience is used to identify changes to program activities for improvement.

2. In 2006, inspection of Unit 1 pre-action system sprinkler heads for the turbine bearing lube oil piping discovered that the sprinkler capsules had overspray on them from a coating system associated with insulation on the generator. An issue report was generated to evaluate the condition. It was determined that the application of overspray on the sprinkler ampule could have affected activation of the sprinkler. The system was non-tech spec and nonsafety-related; however, the affected sprinklers were replaced, and the work order associated with the application of the spray-on coating was revised to include requirements to assure that any areas not to be coated are adequately protected. This example provides objective evidence that discrepancies are identified during walkdowns, that issues are entered into the corrective action program for evaluation, and that process improvements are made to prevent recurrence.

3. In 2009 during performance of a recurring task work order to verify yard hydrant flow rates, it was discovered that a post indicator valve was not fully closing and that the resulting bypass was causing a downstream hydrant barrel to remain filled with water. A condition report was initiated. As the dry-barrel design of hydrants at LGS require the hydrant barrel to drain when closed to prevent damage from freezing in cold weather, action was taken to correct the condition prior to the onset of potentially freezing weather. The leaking valve was subsequently replaced prior to the potential for freezing conditions to adversely affect the hydrant. This example provides objective evidence that discrepancies are identified in the corrective action program, that engineering evaluation of the condition included identification of a need for expedient action to prevent further potential damage, and that corrective action was taken prior to loss of the component's intended function.

4. In 2007, a walkdown of the fire protection system revealed a small leak at the flanged and gasketed joint between a recently replaced valve and a fitting on the unit-common backup fire pump discharge. Although small the condition was identified on an issue report for engineering evaluation and resolution. A preliminary review determined the leak did not have the potential to compromise the fire protection system intended function. Since it appeared that the leak may have been the result of gasket creep or other potentially readily correctable condition, the rapid-response team was assigned to investigate. The flanged connection was tightened and the leak was repaired. This example provides objective evidence that walkdowns can identify discrepancies, that conditions are identified for corrective action, that timely analyses are made to determine if design functions are compromised, and that conditions are corrected prior to loss of a component's intended function.

5. During an inspection in 2005, the exhaust pipe for the unit-common backup diesel driven fire pump diesel engine was found to contain a crack located around the perimeter of the pipe. This was identified on an issue report for evaluation. It was considered a potential operator safety issue due to the possibility of exhaust gases escaping into the building housing the pump during backup pump operation. The engineering evaluation determined that operability of the backup pump was not adversely affected since the engine and pump were capable of performing at design conditions. Parts required for repair were ordered, and a temporary patch repair capable of withstanding the diesel operating conditions was developed, applied, and tested for leak tightness. The required parts were subsequently obtained and installed to complete the permanent repair. This example provides objective evidence that surveillance activities identify degradation, that degradation is entered into the corrective action program for evaluation, and that evaluations and repair are performed in order to maintain component intended functions.

The operating experience of the Fire Water System program did not show any significant age-related deficiencies. Problems identified would not cause significant impact to the safe operation of the plant, and adequate corrective actions were taken to prevent recurrence. Appropriate guidance for re-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. Therefore, there is confidence that continued implementation of the Fire Water System program will effectively identify degradation prior to failure.

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.2.1.19 Aboveground Metallic Tanks

Program Description

The Aboveground Metallic Tanks aging management program is an existing program, which will be enhanced to provide for management of loss of material aging effects for outdoor metallic tanks. The Aboveground Metallic Tanks program applies to metallic tanks, subject to outdoor air and soil environments (Backup Water Storage Tank, 10-T402). This program is a condition monitoring program and credits the application of paint as a corrosion preventive measure. The Backup Water Storage Tank is covered with a spray-on polyurethane foam insulation that adheres to the tank painted surface. This program performs periodic visual inspections to monitor the condition or degradation of the insulation covering. Removal of the tank insulation will be on a sampling basis to permit inspection of the tank painted surface and any resulting metal degradation for the carbon steel tank. Insulation will also be removed for inspection of the tank surface if insulation damage is detected that would permit water ingress to the tank metallic surface. When the tank metallic surface is exposed, the exterior painted surfaces of the tank are inspected for signs of degradation such as flaking, cracking, and peeling to manage the effects of corrosion and prevent conditions similar to those documented in GL 98-04 from occurring.

This program also credits the internal ultrasonic test (UT) inspections that will be performed on the bottom of the tank that is supported by a compacted oil treated sand bed to ascertain the condition of the tank bottom in contact with the sand bed.

Enhancements to this existing program, including performance of tank bottom UT inspections, will be implemented within five years prior to entering the period of extended operation. Tank bottom UT inspections will also be performed whenever the tank is drained.

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:

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 UT measurements of the bottom of the Backup Water Storage Tank. Tank bottom UT inspections will be performed whenever the tank is drained during the period of extended operation and within five years prior to entering the period of extended operation. **Program Elements Affected: Scope of Program (Element 1), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5), Acceptance Criteria (Element 6).**

2. Provide visual inspections of the Backup Water Storage Tank external surfaces and include, on a sampling basis, removal of insulation to permit inspection of the tank surface. The tank external surface visual inspection will be performed on a two-year frequency. **Program Elements Affected: Scope of Program (Element 1), Preventive Actions (Element 2), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5), Acceptance Criteria (Element 6).**

Operating Experience

The following examples of operating experience provide objective evidence that the Aboveground Metallic Tanks program will be effective in assuring that the intended function is maintained consistent with the current licensing basis for the period of extended operation:

1. In June 2000 an inspection of the Backup Water Storage Tank internal surface was performed. The inspection was performed by a diver without draining the tank. The internal surface coating was determined to be in excellent condition with no signs of significant corrosion or scaling. Intersecting welds on the tank floor and walls at selected locations were visually inspected. All welds were determined to be in excellent condition with no signs of pitting or corrosion. All structural members and the ladder were also inspected with no degradation noted. Silt levels were minor with a measured silt depth of three inches in the middle of the tank and zero inches at the tank perimeter. This inspection demonstrates that the existing program monitors the condition of the tank, ensuring that the intended function of the tank is maintained.

2. In September 2007 an inspection of the Backup Water Storage Tank internal surfaces was performed. The tank was drained and visual inspections of the internal surfaces of the tank walls and bottom were conducted. The tank walls and bottom surfaces were inspected for pitting, corrosion, and other forms of deterioration. No deterioration of the surface coatings was identified. This inspection demonstrates that the existing program monitors the condition of the tank, ensuring that the intended function of the tank is maintained.

3. A walkdown of the Backup Water Storage Tank is performed annually to inspect the external surface of the tank. The external tank surface is covered completely by thermal insulation consisting of a spray-on urethane foam. These routine walkdowns have not identified any deterioration in the tank insulation that would warrant insulation removal to inspect the tank external surface coating.

A review of operating experience identified no problems with the Backup Water Storage Tank. Appropriate guidance for re-evaluation, repair, or replacement is provided for locations where degradation is found. Therefore, there is confidence that continued implementation of the Aboveground Metallic Tanks program will effectively identify degradation prior to failure.

Conclusion

The enhanced Aboveground Metallic Tanks program will provide reasonable assurance that the loss of material aging effect will be adequately managed so that the intended function of the Backup Water Storage Tank is maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.20 Fuel Oil Chemistry

Program Description

The Fuel Oil Chemistry aging management program is an existing mitigation 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. Periodically drain water from the Fire Pump Engine Diesel Oil Day Tank and the Fire Pump Diesel Engine Fuel Tank. **Program Element Affected: Preventive Actions (Element 2)**

2. Perform Internal inspections of the Fire Pump Engine Diesel Oil Day Tank, the Fire Pump Diesel Engine Fuel Tank, and the Diesel Generator Day Tanks will be performed 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, cleaned and the internal surfaces either volumetrically or visually inspected. If evidence of degradation is observed during visual inspections, the diesel fuel tanks will require follow-up volumetric inspection. **Program Elements Affected: Preventive Actions (Element 2), Detection of Aging Effects (Element 4)**

3. Perform periodic analysis for total particulate concentration and microbiological organisms for the Fire Pump Engine Diesel Oil Day Tank and the Fire Pump Diesel Engine Fuel Tank. **Program Elements Affected: Parameters Monitored/ Inspected (Element 3), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5)**

4. Perform periodic analysis for water and sediment and microbiological organisms for the Diesel Generator Diesel Oil Storage Tanks. **Program Elements Affected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5)**

5. Perform periodic analysis for water and sediment, total particulate concentration, and microbiological organisms for the Diesel Generator Day Tanks. **Program Elements Affected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5)**

6. Perform analysis of new fuel oil for water and sediment content, total particulate concentration and the levels of microbiological organisms for the Fire Pump Engine Diesel Oil Day Tank and the Fire Pump Diesel Engine Fuel Tank. **Program Element Affected: Parameters Monitored/Inspected (Element 3)**

7. Perform analysis of new fuel oil for total particulate concentration and the levels of microbiological organisms for the Diesel Generator Diesel Oil Storage Tanks. **Program Element Affected: Parameters Monitored/Inspected (Element 3)**

Operating Experience

The following examples of operating experience provide objective evidence that the Fuel Oil Chemistry 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 April 2008, the D12 Diesel Generator Diesel Oil Storage Tank 1B-T527 was drained, cleaned, and inspected. Activities included an inspection of coatings by a certified coatings inspector and a tank internal inspection by a certified Pennsylvania tank inspector. The internal condition of the tank was acceptable. The inspection revealed no evidence of degradation. 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.

2. In May 2008, the D24 Diesel Generator Diesel Oil Storage Tank 2D-T527 was drained, cleaned, and inspected. Activities included an inspection of coatings by a certified coatings inspector and a tank internal inspection by a certified Pennsylvania tank inspector. The internal condition of the tank was acceptable. The coating inspection revealed a chip in the coating at the base of the tank. This condition was entered into the corrective action program, evaluated by engineering, and found to be acceptable without repair. Tracking and trending of the rusting around the chip area was recommended. This example provides objective evidence that deficiencies found during fuel oil tank inspection activities are documented in the corrective action program, and corrective actions are implemented to maintain component intended functions.

3. In May 2010, an assessment of procedures and chemistry sampling activities associated with the Emergency Diesel Generators was performed to ensure compliance with the Technical Specification requirements for fuel oil testing. Activities for new and stored fuel oil were included in the assessment. The assessment verified by a review of procedures and by review of fuel oil analyses that site diesel fuel oil activities meet licensing requirements and commitments for fuel oil quality, testing frequency, and evaluation as specified in the Technical Specifications and its associated ASTM Standards. This example provides objective evidence that assessments are performed to determine the effectiveness of fuel oil program activities.

4. In May 2005, the D21 Diesel Generator Diesel Oil Storage Tank 2A-T527 showed an increasing trend in particulates. Monitoring of particulate over subsequent surveillances indicated a decreasing trend with particulate level eventually returning to a normal value. The results of the analysis and the trending of the monthly particulate levels led to the conclusion that there was likely some dirt contamination in the fuel oil which eventually was eliminated by diesel engine operation. This example provides objective evidence that a) fuel oil monitoring activities identify fuel oil contaminants that can lead to aging effects, b) deficiencies found during fuel oil monitoring activities are documented in the corrective action program, and c) fuel oil monitoring activity deficiencies are evaluated and corrective actions implemented to maintain system intended functions.

The above examples provide objective evidence that the existing Fuel Oil Chemistry program is capable of both monitoring and detecting the aging effects associated with fuel oil environments. Problems identified would not cause significant impact to the safe operation of the plant, and adequate corrective actions are taken to prevent recurrence. Appropriate guidance for re-evaluation, repair, or replacement is provided for locations where degradation is found. Therefore, there is confidence that continued implementation of the Fuel Oil Chemistry program will effectively identify degradation prior to failure.

Conclusion

The enhanced Fuel Oil Chemistry program will provide reasonable assurance that the loss of material aging effect in fuel oil environments 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.2.1.21 Reactor Vessel Surveillance

Program Description

The Reactor Vessel Surveillance aging management program is an existing program that manages the loss of fracture toughness due to neutron irradiation embrittlement of the reactor vessel beltline materials in 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, Revision 2. The Reactor Vessel Surveillance program is part of the BWRVIP Integrated Surveillance Program (ISP) described in BWRVIP-86-A and BWRVIP-116, and approved by the NRC. 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.

The program includes monitoring of 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.

NUREG-1801 Consistency

The Reactor Vessel Surveillance aging management program is consistent with the 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 function are maintained consistent with the current licensing basis during the period of extended operation:

1. BWRVIP-135 provided new information on surveillance capsules in the ISP that represent LGS plates and welds. In accordance with BWRVIP guidance, an evaluation was performed that determined that the utilization of the latest ISP material chemistry data had no negative impact on the P-T curves for LGS. However, the UFSAR was updated to reflect the new best estimate chemistries, chemistry factors, and adjusted reference temperatures for the affected material.

2. BWRVIP-135, Revision 1, provided new information on surveillance capsules in the ISP that represent LGS plates and welds. In accordance with BWRVIP guidance, an evaluation was performed that determined that the utilization of the latest ISP material had no negative impact on the P-T curves for LGS. However, the UFSAR was updated to reflect a new chemistry factor, and the resulting change to the ∆RTNDT, and the adjusted reference temperature for the Unit 1 vessel weld heat 5P6756.

3. BWRVIP-135, Revision 2, provided new information on material data that was not applicable to LGS. However, there were some changes to the requirements for retention of irradiated capsules. The Unit 1 and 2 capsules are installed in the vessel and are currently not scheduled to be withdrawn.

4. The LGS surveillance capsules are monitored for accumulation of effective full power years (EFPY). The current P-T limits are based on a calculated fluence that correlates to 32 EFPY. Surveillance procedures monitor EFPY to verify that the accumulated EFPY does not exceed 32 EFPY. In April of 2010, the projected EFPY through the next cycle for the Unit 1 surveillance capsules was 24.95. In August 2010, the projected EFPY through the next cycle for the Unit 2 surveillance capsules was 21.40. Since both of the projected EFPY values are less than the acceptance criteria of 32 EFPY, no additional evaluations are required.

The operating experience of the Reactor Vessel Surveillance program did not identify an adverse trend in performance. Appropriate guidance for re-evaluation is provided when updated information is provided from the BWRVIP ISP. Therefore, there is confidence that continued implementation of the Reactor Vessel Surveillance program will effectively monitor changes in fracture toughness of the reactor vessel due to exposure to neutron irradiation and the thermal environment.

Conclusion

The existing Reactor Vessel Surveillance program provides reasonable assurance that loss of fracture toughness 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.2.1.22 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.2.1.20), and Lubricating Oil Analysis (B.2.1.27) 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. 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. Technical justification of the methodology and sample size used for selecting components for one-time inspection is documented in the One-Time Inspection Sample Basis Document.

The 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 the period of extended operation.

NUREG-1801 Consistency

The One-Time Inspection aging management program will be 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 provide objective evidence that the One-Time Inspection 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 April 2009, visual (VT) inspection of a Unit 2 main turbine combined intermediate valve found evidence of erosion around the outside of the plug. No evidence of cracking was found. Engineering was requested to perform an evaluation to determine whether the plug could be repaired and reused to rebuild a spare valve for future use in Unit 2. The evaluation concluded that the plug could be reused and provided the requirements for weld repair of the affected areas.

   This example provides objective evidence that a) non-destructive examination (NDE) identifies aging effects prior to the loss of intended function, and b) deficiencies found during NDE are documented and evaluated for impact on system intended functions.

2. In January 2007, an ultrasonic test (UT) examination was performed by Level II inspectors on the Unit 2 Reactor Enclosure Cooling Water system supply piping to the "A" Reactor Water Cleanup System non-regenerative heat exchanger to confirm suspected damage due to cavitation. Results of the examination were forwarded to Engineering for review. The review determined that erosion due to cavitation existed but sufficient wall thickness remained such that continued service would be acceptable until 2024. Periodic inspections were put in place to monitor the progression of erosion due to cavitation.

   This example provides objective evidence that a) NDE identifies aging effects prior to the loss of intended function, b) deficiencies found during NDE are documented and evaluated for impact on system intended functions, and c) follow-up inspections are specified when necessary to confirm remaining design margin assumptions.

3. In October 2009, a through wall flaw (pinhole leak) was found in a Unit 2 4-inch carbon steel Emergency Service Water system pipe. The flaw geometry was categorized by UT examination. An ASME flaw evaluation was performed and the flaw location was found acceptable. Corrective actions included follow-up periodic inspections to monitor the flaw growth rate until that time that the flaw could be repaired. An extent of condition review was performed which concluded that UT examination of additional susceptible locations was required. These examinations were completed and the inspected piping was found acceptable for continued service.

   This example provides objective evidence that a) NDE is effective in identifying and characterizing aging effects, b) deficiencies found during NDE are documented and evaluated for impact on system intended functions, and c) follow-up inspections are specified when necessary to determine extent of condition.

4. In August 2006, a Level II ultrasonic recertification examination was administered to an Outage Services NDE technician. The examination consisted of three parts, two of which were written examinations and one of which was a practical demonstration examination. The technician failed to obtain a passing grade on one of the written examinations. The NDE manager was immediately notified and the technician was informed that he could not perform any UT examinations until his certification was reinstated. The individual had recently been observed in the field by other Level II UT technicians and his work had been review by NDE specialists. There was no evidence to suspect that the work performed by the technician during the period of his qualification was less than satisfactory. In October 2006, the technician retested and passed the examination. As a result, his qualifications were reinstated.

   This example provides objective evidence that a) inspection personnel are qualified in accordance with station procedures and 10 CFR 50, Appendix B, b) deficiencies in qualification are entered into the corrective action program for evaluation, and c) immediate actions are taken to prevent inspections by unqualified inspection personnel.

5. In March 2006, UT inspection of a Unit 1 moisture separator drain tank level control valve identified an area of erosion. Engineering was requested to perform an evaluation of the as-found condition and provide recommendations for the repair of the valve or provide justification for the continued use of the valve. It was concluded that, based on the rate of degradation, continued operation of this valve was acceptable and that UT examination of the valve should be performed during the next refueling outage to assess the condition of the valve at that time. An extent of condition review was also performed as part of the corrective actions and required that the other moisture separator drain tank level control valves be UT inspected for the loss of material.

   This example provides objective evidence that a) NDE identifies aging effects prior to the loss of intended function, b) deficiencies found during NDE are documented and evaluated for impact on system intended functions, and c) follow-up inspections are specified when necessary to determine the extent of condition and to confirm remaining design margin assumptions.

The above examples provide objective evidence that the new One-Time Inspection program will be capable of detecting the aging effects associated with this program. Problems identified would not cause significant impact to the safe operation of the plant, and adequate corrective actions are taken to prevent recurrence. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. Therefore, there is confidence that the implementation of the One-Time Inspection program will effectively identify degradation prior to loss of intended function.

Conclusion

The new One-Time Inspection program will provide reasonable assurance that the aging effects of loss of material, cracking, and reduction of heat transfer 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.2.1.23 Selective Leaching

Program Description

The Selective Leaching aging management program is a new condition monitoring program that consists of one-time inspections of a representative sample of susceptible components to manage loss of material due to selective leaching. The scope of the program will include components made of susceptible materials and located in potentially aggressive environments. Components include piping and fittings, valve bodies, pump casings, heat exchanger components, tanks, and fire hydrants. Susceptible materials are gray cast iron and copper alloy with greater than 15 percent zinc. Environments include raw water, treated water, closed cycle cooling water, waste water, and soil.

The Selective Leaching program will be implemented prior to the period of extended operation. The program will provide for visual inspections, and hardness tests or other appropriate mechanical examinations, as required, to identify and confirm existence of the loss of material due to selective leaching. Technical justification of the methodology and sample size used for selecting components for selective leaching inspections is documented in a technical sample basis document. If degradation is found, the condition of affected components will be evaluated to determine the impact on their ability to perform intended functions during the period of extended operation. Condition monitoring and expanded sampling may be utilized, as required, to ensure the components perform as designed.

Under the Selective Leaching program, visual inspections and hardness tests will be performed to determine if selective leaching is occurring. As such, there are no preventative or mitigative attributes associated with this program. 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) programs, respectively, to minimize corrosive contaminants and to control pH. In some cases, corrosion-inhibiting additives are used. These activities are considered effective in reducing selective leaching.

The Selective Leaching program will be implemented prior to the period of extended operation. One-time inspections will be performed 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.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The following discussion of operating experience provides objective evidence that the Selective Leaching 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 Selective Leaching program is a new program for LGS. 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, aging management program is bounding, i.e., that there is no unique plant-specific operating experience in addition to that described in NUREG-1801. The LGS 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) was searched to determine if selective leaching has been identified for LGS components. No occurrences of selective leaching were found in an exhaustive search of LGS historical information.

No occurrences of selective leaching have been identified at LGS to date. Occurrences that would be identified under the program will be evaluated to ensure there is no significant impact to safe operation of the plant, and adequate corrective actions will be taken to prevent recurrence. Appropriate guidance for re-evaluation, repair, or replacement is provided for locations where degradation is found. Therefore, there is confidence that the implementation of the Selective Leaching program will effectively identify degradation prior to loss of intended function.

Conclusion

The new Selective Leaching program will provide reasonable assurance that 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.2.1.24 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 LGS 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.

The current ISI program for the third ten-year interval, applies Risk Informed Inservice Inspection (RI-ISI) based on EPRI RI-ISI Topical Report, EPRI TR-112657, and ASME Code Case N-578-1 as an approved substitute for the 2001 Edition through the 2003 Addenda of the ASME Section XI Code Edition for Class 1 Examination Category B-J, Item No. B9.21 circumferential welds. Included within the current ISI program is ASME Code Class 1 small-bore piping greater than NPS 1 and less than NPS 4. For LGS units, piping components that are less than or equal to NPS 1 are exempt from the volumetric and external surface examination requirements of IWB-2500 per IWB-1220. Welds within the scope of the program that are greater than NPS 1 have been ranked relative to “consequence risk” as high, medium or low risk per the Limerick Units 1 and 2 Risk Informed Inservice Inspection Evaluation Report that provides the bases for the current RI-ISI program implementation. The current ISI program performs periodic volumetric ultrasonic test (UT) examination of high and medium risk Class 1 small-bore piping butt welds, and visual external surface (VT) examination of high or medium risk Class 1 small-bore piping socket welds. However, the scope of the new One-Time Inspection of ASME Code Class 1 Small-Bore Piping program will also include piping components equal to NPS 1.

Inspection of socket welds will be performed by volumetric examination technique demonstrated to be capable of detecting cracking. If such a volumetric 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 welds.

LGS Units 1 and 2 have been operating for more than 25 years and 21 years, respectively, (less than 30 years) 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. Therefore, a sample size of 8 butt welds on Unit 1, 9 butt welds on Unit 2, and 25 socket welds from each unit is chosen for one-time inspection. This represents more than 10 percent of the total population of small-bore piping butt welds and more than 38 percent of the high and medium consequence ranked socket welds. This ensures an adequate sample size to provide confidence that the aging effect of cracking is not an issue at LGS. 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. Technical justification of the methodology and sample size used for selecting components is documented in a technical sample basis document.

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 LGS 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 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 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 during the period of extended operation:

1. During the 1997 Unit 2 refueling outage, in-service inspection activity identified a small leak from a Unit 2 reactor vessel instrumentation nozzle at a crack in the nozzle safe-end to piping socket weld. The weld and flaw were removed and analyzed to determine the root cause. The root cause analysis included an independent metallurgical evaluation of the crack. The crack was determined to be a 0.2-inch long axial crack in the heat-affected zone of the weld. The root cause of the crack initiation was determined to be improper fit-up such that the instrument line was welded into the nozzle safe-end at a 6-degree offset resulting in extreme localized stresses, crack initiation, and crack propagation. The instrument line to the nozzle safe-end was repaired with proper fit-up. This is the only cracking issue identified in ASME Code Class 1 small-bore piping during the LGS operating history. To address the extent of the condition, ultrasonic inspections were performed on the other three similar Unit 2 instrumentation nozzles. Also, surface inspection using liquid penetrant was performed on all instrument nozzles that were not inspected during the previous refueling outage, and a verification of proper fit-up was performed on all ten Unit 2 2-inch instrument nozzles. During the 1998 Unit 1 refueling outage, penetrant and ultrasonic test inspections were performed on the four similar Unit 1 instrument nozzles, and visual inspections for proper alignment were performed on all ten Unit 1 2-inch instrument nozzles. No additional adverse conditions were identified.

   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. The example also demonstrates that deficiencies are entered into the corrective action program and appropriate actions are taken to evaluate significant deficiencies to determine the root cause, implement additional inspections to determine the extent of condition, and implement corrective actions to prevent recurrence.

2. An extensive review of plant operating experience was performed to determine if LGS 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 all maintenance work requests for reactor coolant boundary systems going back to January 2000, a review of the INPO NPRDS, EPIX databases and correspondence to the NRC, and solicitation of several LGS subject matter experts for their input as to whether such Class 1 small-bore cracking 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 only cracking issue identified in ASME Code Class 1 small-bore piping is discussed above in example 1.

   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. 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 leak identified on the Unit 2 instrument nozzle, described in 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.

4. During the Unit 1 1988 refueling outage, a UT examination identified a cracking indication in a reactor recirculation nozzle to safe end weld. The weld was re-examined in 1990 and Mechanical Stress Improvement Process (MSIP) was performed in 1992. The weld was re-examined following the MSIP in 1992 and during each of the following five refueling outages per NRC GL 88-01 guidance. The last inspection performed in 2010 also did not indicate any growth. Examination of this weld continues per BWRVIP-75-A guidance for Category E welds.

   Although this was a ASME Class 1 large-bore piping weld, this example demonstrates how implementation of industry operating experience and volumetric ultrasonic testing were effectively applied to identify a cracking indication in a reactor coolant pressure boundary piping weld.

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 LGS 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 effective in detecting the intended aging effect of 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. 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.2.1.25 External Surfaces Monitoring of Mechanical Components

Program Description:

The External Surfaces Monitoring aging management program is a new 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 through visual inspection of external surfaces for evidence of loss of material in air-indoor, air-outdoor, and air/gas wetted environments. Visual inspections are augmented by physical manipulation as necessary for evidence of hardening and loss of strength.

Materials of construction inspected under this program include aluminum, carbon steel, copper alloy, ductile cast iron, elastomers, gray cast iron, and stainless steel. Examples of components this program inspects are piping and piping components, ducting, heat exchangers, tanks, pumps, expansion joints, and hoses. The inspection parameters for metallic components include material condition, which consists of evidence of rust, corrosion, overheating, blistering, and discoloration; evidence of insulation damage or wetting; degradation, blistering, and peeling of protective coatings; unusual leakage from piping, ducting, or component bolted joints. Coating degradation is used as an indicator of possible underlying degradation of the component. Inspection parameters for elastomeric components include hardening, discoloration, cracking, dimensional changes, and thermal exposure.

The External Surfaces Monitoring of Mechanical Components program is a visual condition monitoring program that does not include preventive or mitigating actions.

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.

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 and Tanks (B.2.1.29) program. The external surfaces of above ground tanks are inspected via the Aboveground Metallic Tanks (B.2.1.19) program. This program does not provide for managing aging of internal surfaces.

The 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.

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. A comprehensive inspection of external surfaces on LGS plant systems was conducted in 2008, in response to an industry event in which critical system piping leaks developed due to general and pitting corrosion caused by long-term exposure of non-protected carbon steel pipe to a misting air and water environment. The purpose of the LGS inspection was to identify and resolve degraded conditions on piping systems where unprotected or uncoated carbon steel piping was exposed to a wet environment. These inspections were performed by plant personnel who will be performing these inspections under the new External Surfaces Monitoring of Mechanical Components program. Results of the inspection indicated that the components were in good condition. Some occurrences of exterior corrosion were identified, and these issues were entered into the corrective action program for follow-up action. Surfaces were cleaned or recoated as necessary, and technical evaluations of the as-found condition were documented when necessary.

2. During a routine walkdown in 2008, performed by plant personnel who will be performing these inspections under the new External Surfaces Monitoring of Mechanical Components program, corrosion was identified on the Unit 2 D22 emergency diesel generator jacket water heat exchanger outlet piping at a location where the external coating was no longer present. The issue was entered into the corrective action program, and a work order was generated to correct the condition. These surfaces were repainted.

3. During a visual inspection in 2003, performed by plant personnel who will be performing these inspections under the new External Surfaces Monitoring of Mechanical Components program, a Unit 2 Circulating Water System elastomer expansion joint was observed to have abnormal bulges which indicate that the component is degraded. The issue was entered into the corrective action program. An equipment apparent cause evaluation determined that the degraded condition occurred because the material was not designed to be submerged in water. An engineered replacement was installed, follow-up actions were developed, and an extent of condition review was performed.

4. In 2007, an issue report was generated to document fifteen compressed air system carbon steel drain lines that were severely corroded. This issue was entered into the corrective action program, and the corroded lines were replaced.

5. Also in 2007, an issue report was generated to document a degraded flexible boot on a ventilation exhaust fan discharge line. This issue was entered into the corrective action program and a new flexible boot was installed.

The operating experience for the External Surfaces Monitoring of Mechanical Components program did not show any 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. Appropriate guidance for re-evaluation, repair, or replacement is provided for locations where degradation is found. Therefore, there is confidence that the implementation of the External Surfaces Monitoring of Mechanical Components program will effectively identify degradation prior to loss of intended function.

Conclusion

The new External Surfaces Monitoring of Mechanical Components program will provide reasonable assurance that the loss of material and hardening and loss of strength 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 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 aging of the internal surfaces of metallic and polymeric piping, piping elements and piping components, ducting components, tanks, heat exchangers, elastomers, and other components. This program will manage the aging effects of loss of material for metallic and elastomeric components, and hardening and loss of strength for elastomers, in air/gas wetted, closed cycle cooling water, diesel exhaust, fuel oil, lube oil, raw water, treated water, and waste water environments. The program includes provisions for visual inspections of the internal surfaces of components not managed under other aging management programs, augmented by physical manipulation of flexible elastomers where appropriate. Inspections will be performed when the internal surfaces are accessible during the performance of periodic surveillances, during maintenance activities, and during scheduled outages.

Identified deficiencies due to age related degradation are documented and evaluated under the Corrective Action Program. Acceptance criteria are established in the maintenance and surveillance procedures or are established during engineering evaluation of the degraded condition. If the inspection results are not acceptable, the condition is evaluated to determine whether the component intended function is affected, and a corrective action is implemented.

The 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.

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. Internal inspections of the main condenser are conducted during each refueling outage as a routine maintenance activity to identify and correct any degraded conditions prior to returning the unit to service. Review of the inspection results of recent Unit 1 and Unit 2 outages indicates that degraded conditions which were identified were entered into the corrective action program, and either repaired prior to returning the unit to service or evaluated for component operability and scheduled for repair in the subsequent outage. This example illustrates that internal inspections conducted during routine maintenance activities are effective in identifying and correcting degraded conditions.

2. In September 2008, the need to clean the exhaust silencer drain pot for the D13 Emergency Diesel Generator was identified. This issue was entered into the corrective action program and the drain pot was cleaned. An inspection was performed as part of an extent of condition review for the drain pots in each of the other Emergency Diesel Generators, and cleaning was performed where necessary. This example illustrates that internal inspections are effective in identifying the loss of material aging effect, and that the issues entered into the corrective action program are effectively corrected and evaluated for extent of condition.

3. In November 2007, an air leak was discovered in the Unit 2 Reactor Enclosure ductwork which was determined to be caused by a degraded access door seal. This issue was entered into the corrective action program. The effect of this condition on operability of the ventilation system was evaluated, ample margin to the minimum flow requirement was verified, and the repair has been scheduled. This example illustrates that this new program will be effective in identifying elastomer degradation, and that the ability of components to perform their intended function in their as-found condition will be evaluated under the corrective action program.

4. In July 2005, the cooling fins on the 1D reactor feed pump turbine access area unit cooler were found to be clogged with dirt resulting in reduced heat transfer. The concern was entered into the corrective action program, and it was determined that the routine preventive maintenance to clean this cooler was already scheduled through the normal work management process. The cooler was cleaned and returned to service. This example illustrates that internal inspections are effective in identifying degraded conditions, and that the required cleaning was effectively managed under the corrective action program.

5. In July 2001, cracks and degradation were observed in the ventilation ductwork drip pan associated with the emergency switchgear and battery room supply fan. Repairs were performed under a minor maintenance work order. This example illustrates that internal inspections are effective in identifying deficiencies, and that issues identified and entered into the work management process are corrected.

The operating experience of the components in the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program did not show any 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. Appropriate guidance for re-evaluation, repair, or replacement is provided for locations where degradation is found. Therefore, there is confidence that the implementation of the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program will effectively identify degradation prior to failure.

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.2.1.27 Lubricating Oil Analysis

Program Description

The Lubricating Oil Analysis aging management program is an existing program that provides oil condition monitoring activities 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 contamination and determine the physical properties of lubricating oil within operating machinery. These activities are used to verify that the wear product and contamination levels and the physical properties of the lubricating oil are maintained within acceptable limits to ensure that intended functions are maintained.

The program directs the 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 is a condition monitoring program, the monitoring methods 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 bases during the period of extended operation:

1. In August 2005, a lubricating oil sample was obtained from the D22 Emergency Diesel Generator (EDG) generator engine crankcase in accordance with the Lubricating Oil Analysis program. The analysis indicated that viscosity was at a slightly degraded value. Previously the viscosity was typically 14.1 cSt. The August sample indicated a viscosity of 12.4 cSt, which represented a 12 percent reduction. The EDG manufacturer provides guidelines that a drop in viscosity may be an indication that lube oil may be diluted with fuel oil. Additional analyses indicated that the content of fuel oil in the lube oil was approximately one percent, below the program alert level. An issue report was created to evaluate this condition. Since no alert levels were exceeded for any of the lube oil parameters and the viscosity and percent fuel oil content trends did not indicate a fuel oil leak into the lube oil, normal monitoring was continued in accordance with the Lubricating Oil Analysis program. The lubricating oil was subsequently replaced in May of 2007. This example provides objective evidence that the lubricating analysis program is capable of sampling for critical lubricating oil parameters, recognizing a potential condition adverse to quality and implementing appropriate actions.

2. During 2003, a trend was identified regarding increasing water concentration in the lubricating oil for the D14 EDG crankcase. From the beginning of the year, the analyzed water volume was 0.02 percent and had increased to 0.12 percent in September. The alert limit for this parameter was 0.2 percent and was not exceeded. Monitoring was continued on a monthly basis and activities were planned and performed to investigate the source of the water during the next diesel run. Subsequent to the diesel run, the water volume in the lubricating oil returned to 0.01 percent. This example provides objective evidence that the Lubricating Oil Analysis program is capable of making prudent recommendations based on sample results and taking actions to return parameters to normal levels.

3. During March 2009, analysis of the lubricating oil for the Unit 1 Reactor Core Isolation Cooling (RCIC) turbine indicated an elevated particle count in the alert range for this component. In accordance with the Oil Analysis Interpretation Guideline, the oil is required to be changed at the next refueling outage. By definition in the program, parameters in the alert range indicate that there is a low probability of damage or failure of equipment and additional monitoring or analysis may be required. The RCIC turbine lubrication oil was changed in September 2009. This example provides objective evidence that the Lubricating Oil Analysis program is capable of detecting degrading conditions and implementing corrective actions.

4. During November 2008, the lubrication oil sample results for the "C" Schuylkill River makeup pump motor indicated high viscosity. Viscosity for the upper bearing oil was in the fault range and for the lower bearing was just below the alert range. The high viscosity indicates that the oil is approaching the end of life. A recommendation was made to replace the oil. This example indicates that periodic monitoring of oil quality is effective in identifying abnormal conditions and taking corrective action.

5. Analysis of lubricating oil from the Unit 1 RCIC pump bearings in June 2010 indicated the presence of unexpected additives for the correct grade of lubricating oil. Zinc, phosphorus and calcium were detected but are not expected in the DTE 797/DTE 732 oil that is specified for this equipment. All other parameters for the lubricating oil were in the normal range. An Issue Report was created to document the analysis results and perform an evaluation. The most likely source was inadvertent combination of DTE 732 and DTE 26 oil in a single container used for maintenance on another component. Evaluation, including consultation with lubricant suppliers, concluded there was no adverse impact to the properties of the oil. A recommendation was made to flush the bearings and replace the oil. This example demonstrates that the analysis results are reviewed for unexpected results and appropriate actions are taken to resolve the identified issue.

The operating experience provides objective evidence that the Lubricating Oil Analysis program provides for 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. Assessments of the Lubricating Oil Analysis program are performed to identify the areas that need improvement to maintain the quality performance of the program. Therefore, there is confidence that continued implementation of the Lubricating Oil Analysis program will effectively identify degradation prior to failure during the period of extended operation

Conclusion

The existing Lubricating Oil Analysis program provides reasonable assurance that the loss of material and the 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.2.1.28 Monitoring of Neutron-Absorbing Materials Other than Boraflex

Program Description

The Monitoring of Neutron-Absorbing Materials Other Than Boraflex program is an existing condition monitoring program that periodically analyzes test coupons of the boral material in the Unit 1 and Unit 2 spent fuel racks to determine if the neutron-absorbing capability of the material has degraded. This program ensures that a 5 percent sub-criticality margin is maintained in the spent fuel pool.

The Monitoring of Neutron-Absorbing Materials Other Than Boraflex program monitors the physical condition of the boral material in the spent fuel racks by analysis of test coupons for physical attributes, neutron attenuation testing, dimensional checks, and weight and density characteristics. The primary measurements for characterizing the performance of the boral are the coupon thickness measurements (to characterize any bulging or swelling) and neutron attenuation tests (to confirm the continued presence of Boron-10). The other tests provide supporting information to assure that there are no previously unrecognized mechanisms for degradation and to reveal any possible long-term synergistic effects.

The acceptance criteria are for neutron attenuation results to show that a decrease of no more than 5 percent of Boron-10 content has occurred, and that dimensional measurements show that an increase in thickness at any point does not exceed 10 percent of the initial thickness at that point. The existing program will be enhanced to define the test coupon analysis frequency and to address corrective actions to be taken if analysis results do not meet acceptance criteria.

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 enhancements will be implemented in the following program elements:

1. Perform test coupon analysis on a ten-year frequency. **Program Element Affected: Detection of Aging Effects (Element 4)**

2. Initiate corrective action if coupon test result data indicates that acceptance criteria will be exceeded prior to the next scheduled test

coupon analysis. **Program Element Affected: Corrective Actions (Element 7)**

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. Analysis of a test coupon removed from the Unit 2 spent fuel pool in 2001 included an evaluation of physical attributes, neutron attenuation testing, dimensional checks, and weight and density characteristics of the coupon. The results indicated that, after seven years service, the Boral absorbers in the storage racks had retained their dimensional and neutron-absorption properties and were capable of continuing to perform their intended function of controlling reactivity. Analyses of test coupons removed from the Unit 2 spent fuel pool in 1999 and 1997 also provided the same conclusions. This example illustrates that the Monitoring of Neutron-Absorbing Materials Other Than Boraflex program will perform test coupon analyses and evaluate the results to confirm that sufficient sub-criticality margin will be maintained in the spent fuel pool.

2. The Unit 2 maximum density spent fuel storage racks replaced the original spent fuel storage racks in 1994, to increase the storage capacity of the spent fuel pool. The maximum density storage racks are manufactured by Holtec Corporation, and utilize Boral as the neutron-absorbing material. The Unit 1 maximum density spent fuel storage racks were installed in 2002, replacing the original spent fuel storage racks. The Unit 1 maximum density storage racks are identical to the Unit 2 racks. Spent fuel test coupon racks are installed in both spent fuel pools. Three test coupons have been analyzed from the Unit 2 spent fuel pool, although there is currently no requirement to perform test coupon analysis. No test coupons have been analyzed from the Unit 1 spent fuel pool to date. NRC Information Notice 2009-26, “Degradation of Neutron-Absorbing Materials in the Spent Fuel Pool”, has been addressed through the corrective action program. As a result, the current optional spent fuel pool test coupon analysis program will be formally implemented for both nits.

The operating experience of the Monitoring of Neutron-Absorbing Materials Other Than Boraflex program demonstrates that the aging effects of reduction of neutron absorbing capacity, change in dimensions and loss of material are effectively monitored and managed. Problems identified would not cause significant impact to the safe operation of the plant, and adequate corrective actions will be taken to prevent recurrence. Therefore, there is confidence that continued implementation of the Monitoring of Neutron-Absorbing Materials Other Than Boraflex program will effectively identify degradation prior to 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 aging effects of reduction of neutron absorbing capacity, change in dimensions and loss of material 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 Buried and Underground Piping and Tanks

Program Description

The Buried and Underground Piping and Tanks aging management program is an existing program designed to manage the aging of the external surfaces of buried and underground piping and tanks and to augment other programs that manage the aging of internal surfaces of buried and underground piping and tanks. The LGS program addresses piping and tanks composed of metallic materials. This program manages aging through preventive, mitigative, and inspection activities. It manages the aging effect of loss of material in air-outdoor and soil environments.

The Buried and Underground Piping and Tanks aging management 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. Because of these preventive and mitigative techniques, direct inspections of buried piping in contact with soil are not required at LGS per XI.M41, "Buried and Underground Piping and Tanks." Other inspection activities include electrochemical verification of the effectiveness of cathodic protection, non-destructive evaluation of pipe wall thicknesses of underground piping, and visual inspections of the pipe from the exterior during opportunistic excavations.

The Fire Protection System was installed in accordance with National Fire Protection Association (NFPA) Standard 24 and is subject to a flow test as described in section 7.3 of NFPA 25 at a frequency of once a year. Therefore, directed inspections are not required per XI.M41, "Buried and Underground Piping and Tanks."

The program will be enhanced as described below to provide reasonable assurance that buried piping and components of all steel materials that are in scope of the Buried and Underground Piping and Tanks program, including carbon steel and gray cast iron, at LGS will perform their intended function during the period of extended operation.

NUREG-1801 Consistency

The Buried and Underground Piping and Tanks aging management program will be consistent with the ten elements of aging management program XI.M41, "Buried and Underground Piping and Tanks," 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. Evaluate adverse indications and potential inspection expansion, as part of the corrective action program, whenever inspections are performed. **Program Element Affected: Detection of Aging Effects (Element 4)**

2. Coat the underground Emergency Diesel Generator System fuel oil piping prior to the period of extended operation. The coating will be in accordance with Table 1 of NACE SP0169-2007 or Section 3.4 of NACE RP0285-2002. **Program Elements Affected: Preventative Actions (Element 2), Parameters Monitored or Inspected (Element 3), Detection of Aging Effects (Element 4) and Acceptance Criteria (Element 6)**

3. Perform direct visual inspections and volumetric inspections of the underground Emergency Diesel Generator System fuel oil piping and components during each 10-year period beginning 10 years prior to the entry into the period of extended operation. Prior to the period of extended operation all in scope Emergency Diesel Generator System fuel oil piping and components located in underground vaults will undergo a 100 percent visual inspection. Volumetric inspections will also be performed. After entering the period of extended operation, 2 percent of the linear length of in scope Emergency Diesel Generator System fuel oil piping and components located in underground vaults will undergo direct visual inspections and volumetric inspections every 10 years. Inspection locations after entering the period of extended operation will be selected based on susceptibility to degradation and consequences of failure. Visual inspections will be performed by a NACE qualified inspector. **Program Elements Affected: Parameters Monitored or Inspected (Element 3), Detection of Aging Effects (Element 4) and Acceptance Criteria (Element 6)**

4. Perform two sets of volumetric inspections of the Safety Related Service Water System underground piping and components during each 10-year period beginning 10 years prior to the entry into the period of extended operation. Each set of volumetric inspections will assess either the entire length of a run of in scope Safety Related Service Water System piping and components in the underground vault or a minimum of 10 feet of the linear length of in scope Safety Related Service Water System piping and components in the underground vault. Inspection locations will be selected based on susceptibility to degradation and consequences of failure. **Program Elements Affected: Parameters Monitored or Inspected (Element 3) and Detection of Aging Effects (Element 4)**

5. Specify that visual inspections of Safety Related Service Water System underground piping and components will be performed by a NACE qualified inspector. **Program Elements Affected: Parameters Monitored or Inspected (Element 3) and Detection of Aging Effects (Element 4)**

6. Perform trending of the cathodic protection testing results to identify changes in the effectiveness of the system and to ensure that the rectifiers required to protect in scope piping are reliable 90 percent of the time. **Program Elements Affected: Preventative Actions (Element 2), Detection of Aging Effects (Element 4) Monitoring, Trending (Element 5) and Acceptance Criteria (Element 6)**

7. Modify the yearly cathodic protection survey acceptance criterion to meet NACE SP0169-2007 standards. **Program Elements Affected: Preventative Actions (Element 2), Detection of Aging Effects (Element 4) and Acceptance Criteria (Element 6)**

Operating Experience

The following examples of operating experience provide objective evidence that the Buried and Underground Piping and 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 October 2010, Fire water piping was excavated to facilitate replacement of three damaged valve actuators. All of the piping was original to plant construction and was backfilled with Fillcrete (a cementitious controlled low-strength material). In accordance with the shoring and excavation procedure, the condition of the buried pipe was documented when exposed. There were no signs of leakage or corrosion on any piping or components exposed. No coating degradation was noted on either the 6-inch or 12-inch cast iron fire water piping or the copper domestic water piping. The copper domestic water piping was wrapped with tape that was not degraded and was in excellent condition. The original paint on the fire water piping and valves was also in excellent condition including all hardware and bolting. This example provides objective evidence that the condition of buried piping and components is examined during opportunistic inspections. This example also provides evidence that Fillcrete provides excellent corrosion protection to buried components regardless of coating or cathodic protection.

2. In 2009, the industry buried piping initiative was established at LGS. This initiative takes an aggressive approach to provide reasonable assurance of structural and leakage integrity of all buried piping with special emphasis on piping that contains radioactive materials. A condition assessment of all "High Risk" buried raw water piping was instituted. In May, four sections of piping from the Unit 2 Condensate Storage Tank (CST) were inspected using guided wave with satisfactory results (approximately 50 feet). Originally, 16800 feet of RHRSW and ESW buried piping between the Reactor Enclosure and the Spray Pond was thought to be in contact with soil, but a thorough investigation concluded that all of this piping is in Fillcrete (a cementitious controlled low-strength material). In October, seven sections of piping from Unit 2 CST were scheduled to be excavated to complete the guided wave and a coating inspection. This excavation was not completed because fillcrete was encountered. The excavation was discontinued due to the risk of damaging the piping that carries tritiated water. This investigation and excavation concluded that LGS does not have high risk piping per the industry buried piping initiative because the lines are encased in fillcrete or concrete. This example provides objective evidence that LGS is engaged in the industry initiative on buried piping in response to industry operating experience.

3. In May 2008, visual inspections of all of the underground Safety Related Service Water System piping exposed to moist or wet external environments were performed in response to another plant's essential service water operating experience. The Safety Related Service Water System piping that met this criterion consisted of underground piping located in valve pits. Seven valve pits were inspected. Surface corrosion was identified on all of the piping inspected and some exhibited external pitting. Piping in four of the seven valve pits warranted follow-up volumetric inspections. A volumetric scanning technique was used to identify the scope of the ultrasonic testing (UT). The volumetric testing resulted in repair or replacement, continued UT inspections and application of coating. The results of the inspections and testing were entered into the corrective action program and evaluated. All piping in each pit was recoated with coal tar. In addition, preventative maintenance activities were created to perform inspections of all of the underground piping in all of the valve pits on a two-year frequency. This example provides objective evidence that industry events are addressed in a timely manner, degraded conditions are documented and entered into the corrective action program to drive resolution and measures are instituted to prevent reoccurrence.

4. In December 2009, in response to another plant's condensate transfer leak, a review of the LGS buried pipe program was performed to identify all external aluminum piping penetrations associated with buried piping applications. The event at the other plant identified that aluminum piping and components are especially susceptible to coating damage and outside diameter erosion near penetrations. A review of the buried piping database, plant specifications and work order history was performed and documented in the corrective action program. The results indicated that there is no buried aluminum piping that would be susceptible to the failure mechanism identified at the other plant. Although there is no buried aluminum piping, this example provides objective evidence that industry events are addressed in a timely manner and the corrective action program is utilized to screen, evaluate and act on operating experience documents and information to prevent or mitigate the consequences of similar events.

A review of plant operating experience showed that excavation of buried piping has occurred, and no instances of significant age related deficiencies were documented. Problems identified would not cause significant impact to the safe operation of the plant, and adequate corrective actions were taken to prevent recurrence. The work planning process provides instructions to do exterior surface inspections when excavations occur. Appropriate guidance for re-evaluation, repair, or replacement is provided for locations where degradation is found. Assessments of the Buried and Underground Piping and Tanks program are planned such that areas that need improvement to maintain the quality performance of the program are identified. Therefore, there is confidence that the implementation of the Buried and Underground Piping and Tanks program will effectively identify degradation prior to failure.

Conclusion

The enhanced Buried and Underground Piping and Tanks program will provide reasonable assurance that 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.2.1.30 ASME Section XI, Subsection IWE

Program Description

The ASME Section XI, Subsection IWE aging management program is an existing condition monitoring program that provides for inspection of primary containment components including the steel containment liner plate and integral attachments, diaphragm slab carbon steel liner, downcomers and bracing, containment hatches and airlocks, drywell head, penetration sleeves, pressure retaining bolting, and other pressure retaining components for loss of material, loss of preload, loss of leak-tightness, and fretting or lockup. Environments include air-indoor (uncontrolled), and treated water. The scope of the ASME Section XI, Subsection IWE aging management 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.2.1.33) program. Service Level 1 coatings are included in the scope of the Protective Coating Monitoring and Maintenance Program (B.2.1.37).

The program utilizes inspections that detect degradation before loss of intended function. The ASME Code Section XI, Subsection IWE, is a condition monitoring program, which also relies on design change procedures that will be revised 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 Subsection IWE of ASME Section XI, 2001 Edition including 2003 Addenda, 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 (B.2.1.31) 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 2001 Edition with 2003 Addenda of the ASME Code, Subsections IWE-3000 and IWE-3500.

The ASME Section XI, Subsection IWE program implementing procedures and references contain the acceptance criteria for containment surface examinations. 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 in implementing procedures. 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. Manage the suppression pool liner and coating system to:

    a. Remove any accumulated sludge in the suppression pool every refueling outage.

    b. Perform an ASME IWE examination of the submerged portion of the suppression pool each ISI period.

    c. Use the results of the ASME IWE examination to implement a coating maintenance plan to:

        - Perform local recoating of areas with general corrosion that exhibit greater than 25 mils plate thickness loss.

        - Perform spot recoating of pitting greater than 50 mils deep.

        - Recoat plates with greater than 25 percent coating depletion.

    The coating maintenance plan will be initiated in the 2012 refueling outage for Unit 1 and the 2013 refueling outage for Unit 2 and implemented such that the areas exceeding the above criteria are recoated prior to the period of extended operation. The coating maintenance plan will continue through the period of extended operation to ensure the coating protects the liner to avoid significant material loss. **Program Element Affected: Detection of Aging Effects (Element 4)**

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)**

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 2008, during a Focused Area Self-Assessment the Containment Inservice Inspection (CISI) program was benchmarked against other Mark II CISI programs. It was identified that several components were not included in the program. The components not included were: downcomers, downcomer vacuum breaker piping, downcomer vacuum breaker bolting, downcomer bracing, suppression pool columns, and drywell floor penetrations, which separate the suppression pool from the drywell, and the associated supports. This condition was entered into the corrective action program, an apparent cause investigation was performed, and the inspections were scheduled for the next outage. Implementing procedures and program documents were revised to include the additional components and the required inspections. The Unit 2 inspections were completed in March 2009 with satisfactory results. The additional Unit 1 inspections

were completed in March 2010 with some general corrosion, tiger striping, and localized corrosion observed for those added components. The corrosion was within acceptance criteria. This example demonstrates that self-assessments of the Containment Inservice Inspection Program are performed and effectively identify areas for improvement.

2. In 2006, ASME Section XI, Subsection IWE program examinations of Unit 1 were performed for the drywell liner surfaces, drywell head, and the suppression pool including the submerged surfaces of the liner. One localized area of corrosion on a floor panel was spot recoated to prevent additional loss of material. This example demonstrates that loss of liner material is detected and corrective action is implemented before a loss of intended function of the containment liner.

3. In 2005, during ASME Section XI, Subsection IWE program examinations, loose bolts were identified on the access manway located on the Unit 2 drywell head. The bolts were tightened in accordance with the procedure. This condition has not recurred during subsequent outages. This example demonstrates that loss of preload due to self-loosening is detected and corrective actions are implemented prior to a loss of intended function.

4. In 2004, during ASME Section XI, Subsection IWE program examinations, the Unit 1 suppression pool liner was inspected including the vapor space and the submerged space areas. Several indications in the submerged liner were observed, however all indications were acceptable. This example demonstrates that loss of material due to corrosion is detected and evaluated before there is a loss of containment liner 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. Appropriate guidance for re-evaluation, repair, or replacement is provided for locations where degradation is found. 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. Therefore, there is confidence that continued implementation of the ASME Section XI, Subsection IWE program will effectively identify degradation prior loss of intended function.

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.2.1.31 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.

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 201.1 and ACI 349.3R, including cracking, loss of bond, and loss of material in the air-indoor (uncontrolled) environment. The LGS Primary Containments are sheltered within the Reactor Enclosures. 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.

Acceptance criteria specified in the program are consistent with IWL-3000 for concrete containment surfaces. Qualitative acceptance criteria are established by the Responsible Engineer, as defined by the ASME Code, to determine whether observed degradations warrant further evaluation or repair. Quantitative acceptance criteria, developed based on ACI 349.3R guidance, are included in the program implementing documents to augment qualitative assessment by the Responsible Engineer. Conditions that do not meet acceptance criteria are entered in the corrective action program and evaluated for acceptability or subject to repair or replacement, as determined by the Responsible Engineer.

The ASME Section XI, Subsection IWL aging management program utilizes periodic inspections that effectively detect degradation before loss of intended function. The LGS Primary Containments utilize conventional steel reinforcing and do not utilize pre-stressed tendons. No preventive attributes are associated with these activities.

The current program compiles with ASME Section XI, Subsection IWL, 2001 Edition including 2003 Addenda, as approved by 10 CFR 50.55a. In accordance with 10 CFR 50.55a(g)(4)(ii), 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 twelve months before the start of the inspection interval.

The program will be enhanced, as noted below, to provide reasonable assurance that the ASME Section XI, Subsection IWL program aging effects will be adequately managed during the period of extended operation.

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 enhancement will be implemented in the following program element:

1. Include second tier acceptance criteria of ACI 349.3R. **Program Element Affected: Acceptance Criteria (Element 6)**

Operating Experience

Demonstration that the effects of aging are effectively managed is achieved through objective evidence that shows that aging effects and mechanisms are being adequately managed. The following examples of operating experience demonstrate that the ASME Section XI, Subsection IWL program will be effective in assuring that intended functions will be maintained consistent with the current licensing basis for the period of extended operation:

1. In April 2000, the Unit 1 Baseline Containment ISI IWL examinations were completed with satisfactory results. The examination identified a number of areas where minor concrete surface imperfections existed, including random scattered hairline cracking, minor surface voids, popouts, and scaling. The minor cracking and other conditions observed appeared to be previously existing, based on primary containment inspections which were conducted prior to implementation of the ASME Section XI, Subsection IWL program, with no evidence of active growth or extension. Examination results were forwarded to the Responsible Engineer for review. The Responsible Engineer evaluated the conditions and determined that there was no impact on the structural integrity of the containment and were therefore acceptable. This example demonstrates that loss of concrete material (scaling and spalling or popouts), minor surface voids, and cracking are detected, identified, and evaluated before a loss of intended function.

2. In April 2001, the Unit 2 Baseline Containment ISI IWL examinations were completed with satisfactory results. The examination identified a number of areas where minor surface imperfections were observed, including random scattered hairline cracking, minor surface voids, popouts, and scaling. The minor cracking and other conditions observed were previously existing, based on primary containment inspections which were conducted prior to implementation of the ASME Section XI, Subsection IWL program, with no evidence of active growth, extension, or displacement. Although no unacceptable conditions were identified, examination results were

forwarded to the Responsible Engineer for review. The Responsible Engineer evaluated the conditions and determined that the minor imperfections noted had no impact on the structural integrity of the containment and were therefore acceptable. This example demonstrates that loss of concrete material (scaling and spalling or popouts), minor surface voids, and cracking are detected and evaluated before a loss of intended function.

3. In 2004, Unit 1 Containment ISI IWL examinations were completed with satisfactory results. The examination results were forwarded to the Responsible Engineer for review. A surface void (popout) was noted. The surface void was a previously existing condition. However, the Responsible Engineer observed and evaluated the condition and determined that there was no exposed reinforcing steel, no corrosion or staining, and therefore the condition noted was acceptable. The Responsible Engineer observed the other conditions noted and determined they had no impact on the structural integrity of the containment and were therefore acceptable. No changes were noted from the baseline inspections. This example demonstrates that loss of concrete material including surface voids or popouts are detected and evaluated before a loss of intended function.

4. In 2005, Unit 2 Containment ISI IWL examinations were completed with satisfactory results. Examiners identified no unacceptable conditions, no conditions requiring evaluation, and no changes from previous inspections. This example demonstrates that the condition of Primary Containment concrete sheltered within the Reactor Enclosure has not changed.

5. In 2008, Unit 1 Containment ISI IWL examinations were completed with satisfactory results, no conditions requiring evaluation, and no changes from previous examinations noted. This example demonstrates that the condition of the Primary Containment reinforced concrete sheltered within the Reactor Enclosure is not degrading and that no significant changes have occurred.

6. In 2009, a Unit 2 Containment ISI IWL examination was completed with satisfactory results and no changes from previous examinations noted. Examiners identified no unacceptable conditions and no conditions requiring evaluation. This example demonstrates that the condition of the Primary Containment reinforced concrete sheltered within the Reactor Enclosure is not degrading or and that no significant changes have occurred.

The above examples provide objective evidence that the existing ASME Section XI, Subsection IWL program is capable of detecting the aging effects associated with this program. The Primary Containment Structure concrete for Units 1 and 2 has been found during inspections performed in accordance with ASME Section XI, Subsection IWL to be in good condition. The surface scaling, minor surface voids, spalling, popouts, and normal shrinkage cracking conditions identified would not cause any impact to the safe operation of the plant, and no corrective actions were required. Appropriate guidance for re-evaluation, repair, or replacement is provided for locations where degradation is found. Assessments of ASME Section XI, Subsection IWL program are performed to identify the areas that need improvement to maintain the quality performance of the program. Therefore, there is confidence that continued implementation of the ASME Section XI, Subsection IWL program will effectively identify degradation prior to loss of intended function.

Conclusion

The enhanced ASME Section XI, Subsection IWL aging management program will provide reasonable assurance that cracking, loss of bond, 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.2.1.32 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 and loss of mechanical function in the following environments: air-indoor, air-outdoor, and treated water. Bolting for supports is also included with these components and inspected for loss of material and for loss of preload by inspecting for missing, detached, or loosened bolts and nuts in the following environments: air-indoor, air-outdoor, and treated water. 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 ASME Section XI, Subsection IWF program is implemented through corporate and station procedures and complies with ASME, Boiler and Pressure Vessel Code, Section XI, Subsection IWF 2001 Edition through the 2003 Addenda as approved in 10 CFR 50.55(a). In accordance with 10 CFR 50.55a(g)(4)(ii), 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 twelve months before the start of the inspection interval. 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 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, 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)**

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 2007, 63 Unit 2 supports were inspected in accordance with ASME Section XI, Subsection IWF. During this inspection, there were 3 issues identified. The first issue was the cold load setting for one support was found to be outside the 10 percent acceptance criterion. A scope expansion was performed and four additional supports were found to be outside the acceptance criteria. The station evaluated the condition and determined the supports were acceptable in the as found condition. However, the supports were returned to the correct cold load settings and were re-inspected and found satisfactory in 2009. The second issue also involved an apparent out of tolerance cold load setting. However, in this case, it was determined that the drawing was incorrect and required revision. The third issue identified was a lack of thread engagement on a lock nut associated with a pipe support. The evaluation determined that the lock nut used on the pipe clamp support was satisfactory engaged to secure the assembly, and met the design requirements. This example demonstrates that conditions such as out of tolerance support settings are identified, evaluated, additional inspections are performed to determine extent of condition, and that appropriate corrective actions are implemented. This example also demonstrates that other issues such as thread engagement are identified and evaluated for acceptability.

2. In 2006, 63 Unit 1 supports were inspected in accordance with ASME Section XI, Subsection IWF. During the inspections five issues were identified. Two items were labeling issues where no further evaluations were needed. The three remaining issues were entered into the corrective action program for review and disposition by engineering. One issue involved a loose nut on a rigid restraint which was corrected. Engineering determined the “as-found” condition had no impact on ability of the support to perform its design function. Another issue identified a cosmetic concrete condition and moisture around a piping penetration. Engineering determined the concrete placed around the penetration during original construction was not dressed to achieve a cosmetic finish. The evidence of moisture was determined to be an oil stain that did not affect the structural ability of the support. The third issue was improper clearance on a rigid pipe restraint. The engineering evaluation determined that the as found

clearance issue was a result of normal piping displacements and was acceptable for permanent service. A design change was approved to accept and change the required clearance for this support. These examples demonstrate that conditions including loose fasteners and improper clearances are identified, evaluated, and corrected before they impact the intended support functions.

3. In 2005, 65 Unit 2 supports were inspected in accordance with ASME Section XI, Subsection IWF. A loose clamp bolt was identified on two supports which are part of one hanger. This issue was identified in the corrective action program. The engineering evaluation concluded the support was not acceptable in the as-found condition. The bolting was returned to the design configuration and scope expansion was performed to inspect additional supports. These additional supports were inspected during the same outage and they were found acceptable. The support found with the loose clamp bolt in 2005 was inspected again in 2007, and found acceptable. These examples demonstrate that conditions such as loose bolting are identified and corrected and that additional supports are examined as required for similar conditions.

4. In 2004, 82 Unit 1 supports were inspected in accordance with ASME Section XI, Subsection IWF. The only issue identified was a loose lock nut on a snubber pipe clamp. This issue was entered into the corrective action program, and the lock nut was tightened. The engineering evaluation determined that the loose lock nut found did not impact the snubber because the load nuts were found to be tight. This example demonstrates that conditions such as loose lock nuts are detected, evaluated, and corrected as necessary prior to loss of function.

The above examples provide objective evidence that the existing ASME Section XI, Subsection IWF program is capable of detecting the aging effects associated with this program. The piping and component supports inspections performed in accordance with the ASME Section XI, Subsection IWF program have found the supports to be in good condition. Problems identified such as out of tolerance cold load settings, thread engagement, loose fasteners or loose lock nuts, and labeling issues would not cause significant impact to the safe operation of the plant, and adequate corrective actions were taken to prevent recurrence. Appropriate guidance for re-evaluation, repair, or replacement is provided for locations where degradation is found. Assessments of ASME Section XI, Subsection IWF program are performed to identify the areas that need improvement to maintain the quality performance of the program. Therefore, there is confidence that continued implementation of the ASME Section XI, Subsection IWF program will effectively identify degradation prior loss of intended function.

Conclusion:

The enhanced ASME Section XI, Subsection IWF program will provide reasonable assurance that the loss of material, loss of mechanical function, and loss of bolting 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.2.1.33 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 provides for detection of age related pressure boundary degradation due to aging effects including loss of material, loss of sealing, loss of leak tightness, and loss of bolting preload in the containment and various systems penetrating primary containment. The program manages steel containment structural elements, concrete embedments, penetration sleeves, hatches, airlocks, and bolting in air-indoor and treated water environments. The program also provides for detection of degradation of gaskets and seals for the primary containment pressure boundary access points.

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. Demonstration that the effects of aging are effectively managed is achieved through the primary containment leak rate test results. The cumulative leakage test results for Unit 1 as of 1998 are approximately 61 percent of the technical specification limits, and for Unit 2 as of 1999 they are approximately 65 percent of the 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.

2. A Focused Area Self-Assessment (FASA) for the Appendix J program was conducted in July 2007. The purpose of the FASA was to evaluate compliance of the program with the regulatory requirements of 10 CFR 50 Appendix J Option B, Regulatory Guide 1.63, ANSI/ANS 56.8, NEI 94-01, and Exelon procedures. Industry and plant operating experience was considered in performance of the assessment. The conclusion was that the program was considered strong with no deficiencies identified. Activities were assigned to track implementation of the recommendations. This example provides evidence that industry and plant operating experience reviews are performed and that program procedural compliance is achieved.

3. On Unit 1 during the 2008 refueling outage, a valve failed to meet its LLRT acceptance criteria and was scheduled for repair. Following repair the LLRT was re-performed with successful results. A corrective action Issue Report was generated to document the as-found failure. This example provides evidence that components exceeding the allowable leak rate acceptance criteria are entered into the corrective action program, evaluated, repaired, and subsequently retested in accordance with the Appendix J Program.

4. On Unit 2 during the 2009 refueling outage, a motor-operated valve test determined as-found thrust was higher than expected. The torque switch was adjusted to optimize valve performance, but due to the resulting as-left thrust being significantly reduced, a LLRT of the valve was programmatically required to verify valve sealing. The valve was not originally scheduled for testing, but testing was added to the startup restraint log so that the post-maintenance LLRT testing required by the program would be performed. The LLRT was performed with satisfactory results. This example provides evidence that testing required by Appendix J is performed following valve and operator maintenance.

5. In April 2010, performance of a surveillance test found air leakage measured through two Unit 1 primary containment isolation valves was greater than their administrative limit. A technical evaluation was performed that determined that the administrative limit was based on the valves' historically good performance, and the as-found leak rate exceeding the administrative limit presented no significant plant safety impact. Procedural guidance for determining the limits resulted in an allowable leakage that had not been exceeded. In addition, evaluation of the leak determined that it was likely not from the valves but the result of a poor connection with the penetration in the drywell. Since the as-found leakage rate did not affect the unit remaining well within the allowable limit for primary containment leakage, the penetration was determined to be acceptable for continued service until the next refueling outage. Activities were created to assure the penetration is re-tested and repaired as necessary. This example provides evidence that Appendix J test results are evaluated for compliance with the program through the corrective action program, with appropriate measures taken to assure necessary repair.

The operating experience of the 10 CFR Part 50, Appendix J program did not identify any significant age-related deficiencies. Problems identified would not impact safe operation of the plant, and adequate corrective actions were taken to prevent recurrence. Appropriate guidance for re-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. There is confidence that continued implementation of the 10 CFR Part 50, Appendix J program will effectively identify degradation prior to failure.

Conclusion

The existing 10 CFR Part 50, Appendix J program provides reasonable assurance that the identified aging effects of loss of material, loss of sealing, loss of leak tightness, and loss of preload 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 Masonry Walls

Program Description

The Masonry Walls program is an existing program implemented as part of the Structures Monitoring (B.2.1.35) 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 aging management program is a condition monitoring program that provides for inspection of masonry walls for loss of material and cracking and will be enhanced to inspect for shrinkage or 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. Steel edge supports and steel bracing are not required or used as part of the masonry wall design. Masonry walls that are considered fire barriers are also managed by the Fire Protection (B.2.1.17) program.

The scope of the program will be enhanced to include masonry walls in structures that are not currently monitored. The enhancements are discussed below.

NUREG-1801 Consistency

The Masonry Walls 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. Add the following structures with masonry walls to the program scope:

    a. Administration Building Warehouse

    b. Fuel Oil Pumphouse

    c. Transformer foundation dike walls

    Program Element Affected: Scope of Program (Element 1)

2. Provide additional guidance for inspection of masonry walls for shrinkage, separation, and for gaps between the supports and walls that could impact the wall's intended function. **Program Elements Affected: Parameters Monitored or Inspected (Element 3), Acceptance Criteria (Element 6)**

3. Require an inspection frequency of not greater than 5 years. **Program Element Affected: Detection of Aging Effects (Element 4)**

4. Require that personnel performing inspections and evaluations meet the qualifications specified within 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. The Structures Monitoring inspections from 2007 through 2010 included inspections of masonry walls and identified no significant deficiencies. A few instances of acceptable hairline surface cracks were observed. No significant cracks, gaps or other degradation was noted. Cracking due to impact from maintenance equipment was identified on the masonry wall dike around the Unit 2 transformer. The damage caused by the equipment was repaired. This example demonstrates that masonry walls are inspected as required by the Structures Monitoring (B.2.1.35) program. When cracking was identified, it was documented, evaluated and determined to be acceptable. Masonry walls at LGS are in good condition. Damage caused by equipment is identified and repaired, as necessary.

2. The Structures Monitoring inspections completed in 2006 did not identify any unacceptable cracking or gaps in masonry walls. Some minor surface cracking was noted on masonry walls in the Unit 2 Turbine Enclosure near the feed water heater area. This surface cracking had been previously noted and no changes were observed. The results of the inspection concluded that the masonry walls are in good condition. This example demonstrates that minor surface cracks on masonry walls are identified by the Structures Monitoring program.

3. The Structures Monitoring inspections completed in 1998 observed minor cracking of certain masonry walls in Unit 2 Turbine Enclosure and no changes were noted. This example demonstrates that the masonry walls are in good condition and that significant changes in the condition of masonry walls are not occurring.

The above examples provide objective evidence that the existing Masonry Walls program is capable of detecting the aging effects associated with this program. Problems identified would not cause significant impact to the safe operation of the plant, and adequate corrective actions were taken to prevent recurrence. Therefore, there is confidence that continued implementation of the Masonry Walls program will effectively identify degradation prior to loss of intended function.

Conclusion

The enhanced Masonry Walls program as implemented by the Structures Monitoring (B.2.1.35) program will provide reasonable assurance that cracking 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.2.1.35 Structures Monitoring

Program Description

The Structures Monitoring 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 Regulator Guide 1.160, “Monitoring the Effectiveness of Maintenance at Nuclear Power Plants.” The program includes elements of the Masonry Walls (B.2.1.34) 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 for consistency with ACI 349.3R-02. 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. Elastomers will be monitored for hardening, shrinkage and a loss of sealing. 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 the LGS foundations.

Inspection frequency for the in-scope structures will not exceed 5 years, with provisions for more frequent inspections when conditions are observed that have a potential to impact an intended function. Unacceptable conditions, when found, are evaluated or corrected in accordance with the corrective action program.

NUREG-1801 Consistency

The Structures Monitoring 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 structures:

    a. Admin Building Warehouse

    b. Fuel Oil Pumphouse

    c. Service Water Pipe Tunnel

    d. Yard Structures

        - Aux Fire Water Storage Tank Foundation
        - Backup Fire Pump House and Foundation
        - Well Pump #3 Enclosure and Foundation
        - Railroad Bridge
        - Manholes 001 and 002
        - Fuel Oil Storage Tank Dike
        - Transformer foundations and dikes

    Program Element Affected: Scope of Program (Element 1)

2. 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, and other enclosures

    d. Sliding surfaces

    e. Sump and Pool liners

    f. Electrical cable trays and conduits

    g. Electrical duct banks

    h. Tube tracks

    i. Doors

    j. Penetration seals

    k. Blowout panels

    Program Element Affected: Scope of Program (Element 1)

3. Monitor groundwater chemistry on a frequency not to exceed 5 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: Scope of Program (Element 1), Parameters Monitored or Inspected (Element 3), Detection of Aging Affects (Element 4)**

4. 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. Revise storage requirements for high strength bolts to include recommendations of Research Council on Structural Connections (RSCS) Specification for Structural Joints Using High Strength Bolts, Section 2.0. **Program Element Affected: Preventative Actions (Element 2)**

5. Monitor concrete for areas of abrasion, erosion, and cavitation degradation, drummy areas that can exceed the cover concrete thickness in depth, popouts and voids, scaling, and passive settlements or deflections. **Program Element Affected: Parameters Monitored or Inspected (Element 3)**

6. Perform inspections on a frequency not to exceed 5 years. **Program Element Affected: Detection of Aging Affects (Element 4)**

7. Perform inspections of sub-drainage sump pit internal concrete on a 5-year frequency as a leading indicator the condition of below grade concrete exposed to ground water. **Program Elements Affected: Parameters Monitored or Inspected (Element 3), Detection of Aging Affects (Element 4)**

8. Require that personnel performing inspections and evaluations meet the qualifications specified within ACI 349.3R. **Program Element Affected: Detection of Aging Affects (Element 4)**

9. Perform inspection of elastomeric vibration isolation elements and structural seals for cracking, loss of material and hardening. Visual inspections of elastomeric vibration isolation elements are to be supplemented by manipulation to detect hardening when vibration isolation function is suspect. **Program Elements Affected: Detection of Aging Affects (Element 4), Acceptance Criteria (Element 6)**

10. Monitor accessible sliding surfaces to detect significant loss of material due to wear, corrosion, debris, or dirt, that could result in lock-up or reduced movement. **Program Elements Affected: Detection of Aging Affects (Element 4), Acceptance Criteria (Element 6)**

11. Perform opportunistic inspection of below grade portions of in-scope structures in the event of excavation which exposes normally inaccessible below grade concrete. **Program Element Affected: Detection of Aging Affects (Element 4)**

12. Include applicable acceptance criteria from ACI 349.3R. **Program Element Affected: Acceptance Criteria (Element 6)**

13. 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 provided objective evidence that the Structures Monitoring program will be effective in assuring that the intended functions are maintained consistent with the current licensing basis for the period of extended operation.

1. In 2008, fine surface cracks were identified on concrete in the Control Enclosure. The responsible structural engineer evaluated the surface cracks, determined they were not structurally significant, and therefore acceptable. Re-inspection of the cracks was performed on an increased frequency of two years. The re-inspection results where compared with photographic data taken during the previous inspection; no change in the surface cracks was identified. This example demonstrates that the Structures Monitoring program identifies conditions such as cracking, loss of bond and spalling, and these observations are entered into the corrective action program for evaluation. Follow-up inspections are performed on certain conditions at an increased frequency to ensure that subsequent changes will be identified and evaluated before there is an impact on the intended function of the structure.

2. In 2005, a corporate assessment of the Structures Monitoring program identified that the scope of the program did not include certain primary containment internal structures. It was determined that although inspection of these structural elements had been documented during previous Structures Monitoring inspections, the implementing procedure should be revised to ensure continued inspection of the primary containment internal components. The Structural Monitoring program was revised to clarify that the primary containment internal structures are included within the program scope. This example demonstrates that self-assessments are performed and that the results of the assessments are used to enhance the program.

3. In 1991, leakage was identified from the “E” drain line connected to the Unit 2 spent fuel pool (SFP) liner leak chase channels. The leakage has been intermittent and no other drains on either unit show signs of leakage. The leak chase drains are monitored daily by operators. The leakage rate is small at approximately 10 ounces per day, and does not challenge SFP makeup capability. A monitoring plan is in place to ensure that the leak is contained, and that the leakage rate remains small and unchanging. Water samples confirm the source of the leakage to be SFP water. The exterior 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 upon 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.

4. In 2009, wells previously sampled for tritium were also sampled for pH, chlorides, and sulfate concentration. Several wells with elevated chloride content were identified, including the sub-drainage sump pit which collects water from around the base of powerblock structures. Sample results from the sub-drainage sump pit had previously been below 500 ppm for chlorides; however, in March 2011, elevated chloride content (600 ppm) was reported. An issue report was initiated, and corrective actions employed to obtain additional data to determine if a trend exists (e.g. seasonal variations) and to assess the effect, if any, upon below-grade concrete. Inspection of the interior concrete within the sub-drainage sump pit will be performed to directly assess the condition of below-grade reinforced concrete in contact with groundwater. This example demonstrates that when issues are identified which could affect structures they are entered into the corrective action program for resolution.

The above examples provide objective evidence that the Structures Monitoring aging management program is capable of both monitoring and detecting the aging effects associated with this program. Problems identified would not cause significant impact to the safe operation of the plant, and adequate corrective actions were taken. Appropriate guidance for re-evaluation, repair, or replacement is provided for locations where degradation is found. Therefore, there is confidence that continued implementation of the Structures Monitoring program will effectively identify degradation prior to loss of intended function.

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.2.1.36 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 which includes inspection of the Spray Pond and Pumphouse and Yard Facilities dikes around the Condensate Storage Tanks (CST).

Components and commodities monitored include reinforced concrete members, structural steel (screens and screen frames, misc. steel), and earthen water-control structures (embankments, dikes). The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants aging management program addresses age-related deterioration, 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 will be used to manage loss of material, loss of preload, cracking, loss of bond, loss of material (spalling, scaling) and cracking, increase in porosity and permeability, loss of strength, or 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. The aging management program is based on the guidance provided in NRC RG 1.127 and American Concrete Institute (ACI) 349.3R-02. Water control structures are monitored on a frequency consistent with RG 1.127.

The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program is applicable to the Spray Pond and Pumphouse and Yard Facilities dikes around the CSTs. Conformance to NRC's RG 1.127 was part of the original LGS design basis and is addressed in the procedures that monitor the in-service inspections of these structures.

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.

Exception to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the following enhancements will be implemented in the following program elements:

1. Require inspection of structural bolting integrity (loss of material and loosening of the bolts). **Program Elements Affected: Preventative Actions (Element 2), Parameters Monitored (Element 3), Acceptance Criteria (Element 6)**

2. Require monitoring of aging effects for increase of porosity and permeability of concrete structures and loss of material for steel components. **Program Element Affected: Parameters Monitored (Element 3)**

3. Require the proper functioning of dike drainage systems. **Program Element Affected: Parameters Monitored (Element 3)**

4. Require increased inspection frequency if the extent of the degradation is such that the structure or component may not meet its design basis if allowed to continue uncorrected until the next normally scheduled inspection. **Program Element Affected: Detection of Aging Effects (Element 4)**

5. Require (a) 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, and (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)**

6. Monitor raw water chemistry at least once every 5 years for pH, chlorides, and sulfates and verify that it remains non-aggressive, or evaluate results exceeding criteria to assess impact, if any, on submerged concrete. **Program Element Affected: Detection of Aging Effects (Element 4)**

7. Require visual examinations of the Spray Pond and Pumphouse submerged wetwell concrete for signs of degradation during maintenance activities. If significant concrete degradation is identified, a plant specific aging management program should be implemented to manage the concrete aging during the period of extended operation. **Program Element Affected: Detection of Aging Effects (Element 4)**

8. Require that active cracks in structural concrete or extent of corrosion in steel are documented and trended, until the condition is no longer occurring or until a corrective action is implemented. **Program Element Affected: Monitoring and Trending (Element 5)**

9. 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)**

10. 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: Preventative Actions (Element 2)**

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. In 2008, during inspections around the Unit 1 CST dike, vegetative growth was observed. This growth was seen coming from cracks at the base of the dike and along the walls. Corrective actions were implemented to remove the vegetation and seal the cracks. Additionally, a preventative maintenance activity was implemented to annually apply herbicides to reduce future growth. This example provides objective evidence that conditions requiring corrective actions are identified and that preventative maintenance is performed and implemented when conditions that could affect structure's intended functions are identified.

2. In 2009, the results of the annual preventative maintenance activity for measuring the Spray Pond silt indicated an increase in the rate of deposits. The monitoring frequency was increased, based on the increasing trend of silt build-up, from once a year, to once every 6 months. The expected silt depth at the next measurement is projected, based on the deposition rate, to ensure that silt will not exceed acceptable levels. This example provides objective evidence that periodic monitoring of the Spray Pond is performed along with appropriate corrective actions to effectively manage the silt levels and ensure adequate cooling water is available when required.

3. In 2009, a periodic inspection identified vegetative growth near the Pumphouse and on various locations of the Spray Pond embankments. An issue report was initiated and the vegetation was removed. This example provides objective evidence that the periodic inspections and walkdowns are routinely performed to identify conditions which could impact the intended function of these water control structures. This example also demonstrates when adverse conditions are identified they are entered into the corrective action program and corrected as required.

The above examples provide objective evidence that the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program is capable of detecting the aging effects. Problems identified would not cause significant impact to the safe operation of the plant, and adequate corrective actions are taken to prevent recurrence. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. 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 loss of intended function.

Conclusion

The enhanced RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants aging management program will provide reasonable assurance that the 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.2.1.37 Protective Coating Monitoring and Maintenance Program

Program Description

The Protective Coating Monitoring and Maintenance Program is an existing condition monitoring program that provides for aging management of Service Level I coatings inside the LGS primary containment 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 provides for coating system visual inspection, assessment, 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 at LGS. This program ensures that the Service Level I coatings maintain adhesion so as to not effect 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 Emergency Core Cooling Systems (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 will be 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

Prior to the period of extended operation, the following enhancement will be implemented in the following program element:

1. Create the position of Nuclear Coatings Specialist qualified to ASTM D 7108 standards. **Program Element Affected: Detection of Aging Effects (Element 4)**

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 function of Service Level I coatings are maintained consistent with the current licensing basis for the period of extended operation.

1. Service Level I coating inspections in the submerged region of the Unit 1 suppression pool were performed during refueling outages 1R10 (2004), 1R11 (2006), and 1R13 (2010). These inspections covered 100 percent of the accessible Service Level I coatings on the suppression pool liner, downcomers, and columns. Assessments were performed to document identified coating defects and deficiencies. To date, four areas of corrosion have been preemptively spot recoated.

   To address the condition of the submerged suppression pool coating, an apparent cause evaluation was completed as part of the corrective action program. Improved plans for monitoring coating and containment liner corrosion for both Unit 1 and Unit 2 have been developed and are in the process of being implemented through the ASME Section XI ISI program. These actions will ensure that areas exhibiting coating defects and deficiencies are evaluated, impacts on liner degradation are determined, and recoating plans are developed.

   This example provides objective evidence that the loss of coating integrity due to defects and deficiencies is detected and evaluated, and corrective action implemented, prior to the loss of intended function.

2. Service Level I coating inspections in the submerged region of the Unit 2 suppression pool were performed during refueling outage 2R10 (2009). These inspections covered 100 percent of the accessible Service Level I coatings on the suppression pool liner, downcomers, and columns. To date, no coating repairs have been performed.

   The inspection findings were entered into the corrective action program. Corrective actions have been established as discussed in OE item 1 above.

   This example provides objective evidence that the loss of coating integrity due to defects and deficiencies is detected and evaluated, and corrective action implemented, prior to the loss of intended function.

3. A design change package approved the permanent removal of the reactor recirculation pump motor hoists from the Unit 1 Primary Containment. As part of the design change impact review, it was determined that removal of the hoists would reduce the amount of unqualified coating in the Primary Containment and that the design analysis that evaluates the containment unqualified coatings inventory against ECCS suction strainer capacity was impacted. As a result, the design analysis was revised and the total weight determined in the unqualified coatings inventory of the calculation was reduced due to the elimination of the hoists.

This example provides objective evidence that unqualified coatings in the Primary Containment are controlled to ensure that the amount of unqualified coating is kept within acceptable limits.

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. 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 enhanced Protective Coating Monitoring and Maintenance Program will provide reasonable assurance that aging effects of Service Level I coatings will be adequately managed so that the intended function of Service Level I coatings 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

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 program that will be used to manage aging of the insulation material for non-EQ cables and connections within the scope of license renewal that are subject to adverse localized environments. An adverse localized environment is a condition in a limited plant area that is significantly more severe than the specified service environment for the cable or connection.

Accessible cables and connections 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. 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 will be 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. A 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. The subject design configuration described in the LER does not exist at LGS, by virtue of plant design, equipment and cable specification, environmental design limits, design and maintenance of HVAC systems, design of raceways, and monitoring of environmental conditions. This evaluation provides objective evidence of the robustness of LGS insulation design and the effective utilization of industry operating experience in assessing cables and connections in potentially adverse localized environments.

2. In March 2008, during performance of motor rework for a Unit 1 drywell area unit cooler it was identified that the power feed and associated flex conduit had what appeared to be a burn hole. The cable was repaired, and the flex conduit was reinstalled. A search of completed motor work and the motor work performed during the in-progress and past two refuel outages was done, looking for similar occurrences of cable and conduit damage. No similar occurrences were identified. The observed damage was attributed to vibration. This operating experience, although not attributed to an adverse localized environment, provides objective evidence that existing maintenance practices and the corrective action program effectively identify and correct observed cable jacket deficiencies.

3. In March 2009, during performance of a routine functional check of a level switch for the Unit 2 moisture separator drain tank it was identified that the outer jacket for the level switch circuit was breaking down and brittle. The wire insulation appeared to be in general good condition. The cable jacket was repaired per standard process using heat shrink electrical tape. The associated switch was found in calibration during post maintenance testing, confirming circuit integrity. This operating experience provides objective evidence that existing maintenance practices effectively identify observed cable jacket deficiencies.

4. In March 2010, during performance of a Unit 1 Limitorque motor operated valve (MOV) preventive maintenance task on a main steam branch isolation valve, it was identified that the outer jacketing on the power and control cable was cracked and brittle. The wire insulation appeared to be in general good condition. The degraded cable jacket extended into both the flex and rigid steel conduit raceways that routed the cables to the MOV. The cable jacket was repaired per standard process using Raychem sleeving. The associated motor operated valve was successfully operated during post maintenance testing, confirming circuit integrity. This operating experience provides objective evidence that existing maintenance practices and the corrective action program effectively identify and correct observed cable jacket deficiencies.

5. 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 Notice discusses three issues, the first two attributable to inadequacies in installation and design. The third issue was for cables subjected to adverse localized temperature environment, in excess of design temperatures. The review identified design criteria, electrical calculations, and maintenance practices which minimize the occurrence of these issues at LGS, including design criteria requiring separation from heat sources. This evaluation included a search of operating experience for similar occurrences; none were identified. This industry operating experience review provides objective evidence that existing design and installation practices minimize the occurrence of cable and connection insulation damage due to potentially adverse localized environments.

The operating experience related to the new Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program did not show any 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. 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 program will effectively identify insulation degradation prior to loss of intended function.

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 reduced insulation resistance will be adequately managed so that the intended functions of cables and connections are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.39 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 program that will be used to manage aging of non-EQ cable and connection insulation of the in scope portions of the Process Radiation Monitoring and Neutron Monitoring Systems.

The in scope process radiation monitoring and neutron monitoring circuits are sensitive instrumentation circuits with high voltage, low-level current signals and 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.

Calibration testing will be performed for the in scope process radiation monitoring circuits. Direct cable testing will be performed for the in scope neutron monitoring circuits. These calibration and cable tests will be performed and results will be assessed for reduced insulation resistance prior to the period of extended operation and 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. NRC Information Notice 97-45, Environmental Qualification Deficiency for Cables and Containment Penetration Pigtails, July 2, 1997 and its supplement issued in February 1998 discuss potential environmental qualification deficiencies in containment cabling insulation material with respect to circuit operating parameters and ambient environments. This deficiency could potentially result in the control room operators receiving incorrect radiation level information. At LGS, Local Power Range Monitor (LPRM) organic cables were replaced with silicon dioxide cables, demonstrating the understanding that these cables' insulation material shall be suitable for the under vessel environment. This issue provides objective evidence that industry operating experience is assessed and applied to commodity material selections.

2. In March 2006, it was identified that a Unit 1 LPRM had a defective connector on the under vessel end of the cable that connects the detector to the pull box in the drywell. Troubleshooting identified that the electrical connection under vessel was affecting continuity and causing the less than adequate LPRM performance. The cable and connector were replaced. Subsequent circuit testing was completed and met acceptance criteria. 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 circuit deficiencies.

3. In July 2008, during performance of a surveillance test it was identified that the cable from the detector to the preamp for a common Residual Heat Removal Service Water radiation monitor failed. The failure resulted from the cable physically separating from the inside of the connector. Failure was attributed to deterioration of the braiding. The suspected cause was attributed to either a faulty connector or wear from repeated connection and disconnection. The connector was replaced. Subsequent tests met acceptance criteria. 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 circuit deficiencies.

4. In February 2009, during performance of calibration for preventive maintenance it was identified that a Unit 2 Intermediate Range Monitor (IRM) detector did not meet the acceptance criteria for the I/V Curve test. Troubleshooting was performed including direct cable tests of the complete circuit, testing of outboard and inboard penetration connections, testing of under vessel connections, and direct cable tests of the circuit upstream of the under vessel connections. It was determined that the under vessel connection was the cause of not meeting test acceptance criteria. The connection was replaced. Post connection replacement test results were satisfactory. 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 circuit deficiencies.

5. In April 2010, an evaluation was performed for low insulation resistance test results for the recently installed Unit 1 and Unit 2 LPRM detectors. The cause of the low insulation test results was attributed to moisture intrusion during performance of under vessel maintenance on the LPRMs. Improvements were made to the maintenance practices to address continued use of current foreign material exclusion techniques, improving physical and environmental barriers for moisture intrusion during maintenance and reconnection of LPRMs, and improving other under vessel maintenance activities to limit exposure of instrument cable and connections to water spray or leakage. Aging effects were not identified as a contributing cause to the test results. 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 circuit deficiencies.

The operating experience related 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 show any 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. 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.

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 reduced insulation resistance will be adequately managed so that the intended function of these instrumentation cables and connections are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.40 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 program is a new program that manages non-EQ, in scope, inaccessible power cables that are exposed to significant moisture. For this program, power is defined as greater than or equal to 400 V. Significant moisture is defined as periodic exposure to moisture that lasts more than a few days (e.g., cable wetting or submergence in water). Periodic exposures that last less than a few days (e.g., normal rain and drain) are not significant. 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 in the scope of this aging management program will be tested using a proven test for detecting deterioration of the insulation system due to wetting, 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 6 years. The first tests will be completed prior to the period of extended operation.

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 inspection results. The frequency of inspection will recognize that the objective of the inspections, as a preventive action, is to minimize potential exposure of in scope cables to significant moisture. 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 inspection 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 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 LGS-specific operating experience was documented in the Exelon corporate response to the generic letter. The response identified LGS medium voltage cable failures, specifically in 13 kV, nonsafety-related power feeds to Circulating Water pump motors and a nonsafety-related plant services transformer, with three failures occurring in 1995 and one failure occurring in 2000. The failures were attributed to manufacturing defects in Anaconda Unishield cable, specifically voids and impurities in the Ethylene Propylene Rubber (EPR) insulation coupled with operation in a wet environment. There were no failures of cables that are in scope for license renewal. As a result, potentially wetted, safety or generation critical cables operating at 13 kV are now periodically tested using very low frequency (VLF) dissipation factor testing. 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 include: 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. LGS evaluated the operating experience presented in the SEN. The specific evaluation performed for LGS addressed several factors for cable condition monitoring. As a result of this evaluation LGS identified and documented their inaccessible medium voltage cables, the cable functions, and the associated potential consequence of failure. In addition, the evaluation included identifying strategies for cable testing and preparedness for cable replacement. This evaluation of medium voltage, generation significant circuits, safety-related circuits, and offsite power feed circuits, provides objective evidence that inaccessible cable industry operating experience is assessed and incorporated into LGS practices.

3. In 2009, inspection of a nonsafety-related manhole identified degradation of supports and other manhole internal commodities due to water intrusion. Extent of condition inspections were performed for three other nonsafety-

related manholes located in the same proximity. Water intrusion was also observed in these manholes. A common dewatering plan for these four manholes (two of which are in scope for license renewal) and the other 40 manholes (10 of which are in scope for license renewal) on the LGS site was developed including actions to initiate modifications for sump pumps or other dewatering devices for the manholes susceptible to water intrusion. This site specific operating experience, the associated analysis, and the subsequent plans for modification provide objective evidence that manhole issues are identified and evaluated, with subsequent effective corrective actions included in the corrective action program.

4. In 2010, an Exelon Nuclear Event Report 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 include:

   - identifying the inaccessible, underground cables
   - identifying which of these cables are in scope for maintenance rule and license renewal
   - identifying the 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 routed 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 are currently in progress. These actions provide a cable condition monitoring program that implements cable testing and uses the test results to prioritize cable replacements. These actions provide an improvement initiative to manholes to prevent exposing inaccessible power cables to significant moisture. These actions are included in the Corrective action program. 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.

There have been no failures of in scope, inaccessible power cables at LGS. Failures have been limited to medium voltage circuits not in scope for license renewal. These circuits are subject to operating voltage and carrying load a majority of the time. Adequate corrective actions were taken to prevent recurrence and are continuing to be implemented through the corrective action program and current improvement initiatives. Appropriate guidance for re-evaluation, repair, or replacement is provided for locations where degradation is found. Therefore, there is confidence that the implementation of the Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program will effectively identify degradation prior to failure.

Conclusion

The new Inaccessible Power Cables Not Subject to 10 CFR 50.59 Environmental Qualification Requirements program will provide reasonable assurance that reduced insulation resistance will be adequately managed so that the intended functions of inaccessible power cables are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.41 Metal Enclosed Bus

Program Description

The Metal Enclosed Bus aging management program is a new program that will be used to manage aging of in scope metal enclosed bus during the period of extended operation. The internal portions of the bus enclosure assemblies will be inspected for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of water intrusion. The bus insulation will be visually inspected for signs of reduced insulation resistance, such as embrittlement, cracking, chipping, melting, discoloration, swelling, or surface contamination. The internal bus insulating supports will be visually inspected for structural integrity and signs of cracks. Enclosure assembly elastomers will be visually inspected for surface cracking, crazing, scuffing, dimensional change, shrinkage, discoloration, hardening, and loss of strength. A sample of accessible bolted connections will be inspected for increased resistance of connection using thermography. The sample will be 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 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. Enclosure assembly elastomers are to be free from unacceptable visual indications of degradation. The selected sample of bolted connections inspected by thermography will be confirmed to be within the acceptance criteria established in program implementing procedures.

The inspections and thermography will be performed at least once every 10 years for indications of aging degradation. This new program will be implemented prior to the period of extended operation. In addition, the first tests and inspections will be completed 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

None.

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 January 2007, a material condition walkdown was performed. Observations included oil apparently leaking from the Safeguard Bus Duct in the Unit 2 Turbine Enclosure. The follow-up investigation identified the source of the leak as the generator alterex for both units. Repairs were made, and oil was cleaned up, restoring the condition of the bus duct. This issue provides objective evidence that the station corrective action program provides an effective mechanism for correcting identified deficiencies to assure the continued operation of the metal enclosed bus.

2. In October 2002, a Nuclear Event Report (NER) was issued to Exelon stations for an isophase bus duct insulator failure at another plant. The cause was identified as internal arcing. Fleet-wide corrective actions included implementation of hi-pot testing of isophase and non-segregated metal enclosed buses every six years. The issue provides objective evidence that the Exelon corrective action and operating experience programs ensure that best practices for condition monitoring are implemented so that degraded conditions are identified and corrected prior to equipment failure.

3. In February 2009, LGS performed an evaluation of industry operating experience for non-segregated bus degradation at a pressurized water reactor (PWR). This operating experience item was issued as a result of corrosion found during bus bar inspection. The PWR plant investigation identified that the lack of periodic visual inspections allowed for water intrusion that resulted in degradation and corrosion. The LGS evaluation for applicability identified that previously initiated corporate wide corrective actions for the NER had already assured implementation of prudent metal enclosed bus condition monitoring. This issue provides objective evidence that the station corrective action and operating experience programs ensure that best practices for condition monitoring are implemented so that degraded conditions are identified and corrected prior to equipment failure.

4. In November 2009, Significant Event Report SER 5-09 was issued for a 6.9 kV non-segregated bus failure. LGS has not experienced similar issues with their metal enclosed bus. In response to this industry OE, LGS initiated activities to incorporate the lessons learned from this event, specifically adding 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 related to the new Metal Enclosed Bus program did not show any 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. Therefore, there is confidence that the current design, installation, and maintenance practices along with implementation of the new Metal Enclosed Bus program will effectively identify degradation prior to failure.

Conclusion

The new Metal Enclosed Bus program will provide reasonable assurance that increased resistance of connection, reduced insulation resistance, surface cracking, crazing, scuffing, dimensional change, shrinkage, discoloration, hardening, and loss of strength will be adequately managed so that the intended function of the in scope metal enclosed buses are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.42 Fuse Holders

Program Description

The Fuse Holders aging management program is a new program that applies to fuse holders located outside of active devices that have been identified as susceptible to aging effects. Fuse holders located inside an active device are not within the scope of this program. This program will be used to manage aging of the metallic portions of fuse holders. Stressors managed by this aging management program include frequent manipulation, vibration, chemical contamination, corrosion, oxidation, ohmic heating, thermal cycling, and electrical transients. Fuse holders subject to increased resistance of connection or fatigue, will be tested, by a proven test methodology, at least once every 10 years for indications of aging degradation. Visual inspection is not part of this program.

The new Fuse Holders program will be implemented prior to the period of extended operation. In addition, the first tests will be completed prior to the period of extended operation.

NUREG-1801 Consistency

The Fuse Holders aging management program will be consistent with the ten elements of aging management program XI.E5, "Fuse Holders," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The following examples of operating experience provide objective evidence that the Fuse Holders 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 2004, a Unit 2 Drywell Cooler Drain Flow High alarm was received several times. Drywell leakage was verified to remain within normal technical specification limits. Investigation identified a defective fuse holder clip. The fuse holder clip was not providing enough force to make good contact with the fuse. The fuse holder clip was repaired, a post maintenance test was completed with satisfactory results, and the intermittent alarm ceased. Repeated removal and reinsertion of the fuse was the likely cause of spreading the fuse holder resulting in poor contact

between the clip and fuse. Subsequent actions added this operating experience to the pre-job brief portion of the surveillance test that removes and reinserts the fuse, to prevent recurrence. Additionally, the extent of condition was investigated to assure that other fuse holder clips experiencing the removal and reinsertion stressor had not been degraded. This operating experience provides objective evidence that existing maintenance practices and the corrective action program effectively identify and correct deficiencies with the metallic portions of fuse holders.

2. In March 2005, main control room indication for a Unit 2 HPCI suppression pool suction valve was lost. Troubleshooting determined that the lost indication may be due to a fuse failure. The inspection identified a failed fuse block. The lug to leaf joint rivet of the fuse block was deformed. The fuse block was replaced, and the component satisfactorily tested. Stressors from vibration and mechanical stress due to removal and reinsertion were determined to not be applicable to this failure. Subsequent failure analysis of the fuse block identified this deficiency as the result of the support rivet not being securely fastened due to incomplete roll of the rivet during assembly by the manufacturer. The extent of condition inspections were performed for both installed and inventory fuse blocks. No additional defects were identified. Maintenance procedures were revised to address this potential manufacturing defect. This operating experience, although not attributed to age degradation, provides objective evidence that existing maintenance practices and the corrective action program effectively identify and correct observed fuse clip deficiencies.

3. In October 2009, a Unit 1 Reactor Enclosure Ventilation Exhaust radiation monitor alarmed downscale which resulted in a partial containment isolation. After immediate procedural actions, an investigation determined that downscale indication was the result of a broken fuse holder, specifically the Bakelite insulating material. The holder had fractured releasing tension on the fuse, thus preventing electrical contact. The fuse holder, insulating and metallic parts, did not exhibit any discoloration or signs of heating. Subsequent analysis of the fuse holder attributed the failure to tool marks found adjacent to the circumferential fracture. Long-term spring force against the fuse and exercising the fuse holder resulted in failure. The investigation concluded that this damage occurred during initial installation or at the manufacturer's facility. The extent of condition evaluations found one other damaged (i.e., chipped) fuse holder that has been scheduled for replacement. This operating experience, although not attributed to age degradation, provides objective evidence that existing maintenance practices and the corrective action program effectively identify and correct observed fuse clip deficiencies.

The operating experience related to the new Fuse Holders program did not show any 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. Therefore, there is confidence that the current design, installation, and maintenance practices along with implementation of the new Fuse Holders program will effectively identify degradation prior to failure.

Conclusion

The implementation of the new Fuse Holders program will provide reasonable assurance that increased resistance of connection and fatigue will be adequately managed so that the intended functions of fuse holders within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.1.43 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 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. A representative sample of non-EQ electrical cable connections will be selected for one-time testing considering application (medium and low voltage), circuit loading (high loading), 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 technical basis for the sample selected is to be documented. 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.

The new Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements 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.

Operation 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 provide confirmation that the intended functions of electrical cable connections are maintained consistent with the current licensing basis for the period of extended operation.

1. In September 2005, during routine thermography, a Unit 2 480 V breaker to an HVAC 120 V Distribution Panel was observed to have an elevated temperature on the "C" phase outgoing cable. It was recommended that the connection be cleaned and tightened. Monthly monitoring of the connection was performed. During increased frequency monitoring, the associated breaker tripped. It was identified that an organizational weakness allowed for errors in the coding of action requests to perform increased equipment condition monitoring; therefore, the breaker trip was the result of a single work process error. Work control procedures were revised to address action request coding. This internal operating experience provides objective evidence that processes controlling maintenance are assessed and corrected as improvement opportunities are identified.

2. In January 2009, a Unit 2 480 V breaker to a drywell unit cooler failed, resulting in a trip of the upstream load center breaker on overcurrent. A root cause analysis identified the cause of this event as less than adequate diagonal entry connection configuration for the "A" phase termination, resulting in a non-uniform loading on the cable and a high resistance connection. This condition was directly related to the physical arrangement of the MCC compartment and breaker and the internal routing options and stiffness of the cable. This root cause analysis also identified other opportunities for improvement in electrical connection techniques. It was suggested that inclusion of electrical connection torque values in Maintenance procedures would provide greater assurance that connections were properly made. Additionally, thermographic examinations, based on following pre-set ordering of equipment, resulted in thermography being performed when equipment was not energized. Maintenance procedures were revised to include electrical connection torque values, and thermography routes were revised so that energized connections were being inspected, some in conjunction with Baker Box testing. This operating experience, although not attributable to age degradation, provides objective evidence that operating experience is used to improve diagnostic processes and Maintenance procedures to ensure preventive and predictive maintenance implements best practices, precluding equipment unavailability or failure.

3. In May 2009, elevated temperatures were found during routine thermography on the incoming "B" phase wire to a Unit 1 Standby Liquid Control tank heating element breaker. Troubleshooting identified that the terminal block screw was stripped. The screw was replaced and subsequent thermography confirmed a reduction in temperature, yet the connection required additional action since the delta between "B" phase connection temperature and "A" or "C" phase connection temperatures, exceeded condition monitoring thresholds. Increased frequency thermography is being performed to monitor the connection until incoming leads are repaired or replaced. Repair and replacement work is planned and scheduled. This item provides objective evidence that the current maintenance practices are adequate to effectively identify items for correction, perform interim actions, and monitor until a final repair can be implemented.

4. In September 2009, elevated temperatures were found during routine thermography on the incoming "A" and "B" phase wires to a Unit 2 drywell area unit cooler breaker. Similarly, in January 2010, elevated temperatures were found during routine thermography on the incoming "A" phase wire to another Unit 2 drywell area unit cooler breaker. Also, in February 2010, elevated temperatures were found during routine thermography on the incoming "B" phase wire to a Unit 1 Residual Heat Removal pump room cooler breaker. During investigation of the connections, leads were tightened. Post-maintenance thermography connection temperatures were acceptable; no further action was warranted. These items provide objective evidence that the current maintenance practices are adequate to effectively identify and correct connection issues, prior to impact to equipment operations.

The operating experience related to the new Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program did not show any 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. Appropriate guidance for re-evaluation, repair, or replacement is provided if degradation is found. Therefore, there is confidence that the implementation of the 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.3.1 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 program is an existing program that monitors and tracks the number of critical thermal, pressure, and seismic transients specified in Technical Specification 5.6 as well as those listed in LGS UFSAR Table 3.9-2, "Design Events," and Table 5.2-9, “RCPB Operating Thermal Cycles.” The program requires comparison of the actual event parameters (pressure, temperature, or flow rate changes) to the applicable design transient definitions to assure the actual transients are bounded by the applicable design transients. The program includes counting the operational transients to assure 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 environmental fatigue analyses, which is the cycle limit for each transient type. For license renewal, fatigue cycle monitoring data was trended to predict the numbers of operational transient cycles that will occur during 60 years. These projections show that the current cycle limits will not be exceeded in 60 years. Therefore, the current cycle limits will be maintained for the period of extended operation.

The effect of the reactor coolant environment on reactor coolant pressure boundary (RCPB) component fatigue life has been determined by performing environmental fatigue analyses for a sample of critical locations selected using NUREG/CR-6260 guidance. Additional environmental fatigue analyses were performed for limiting locations within each RCPB system and each RPV component with a Class 1 fatigue analysis. The RCPB systems at LGS are designed in accordance with ASME Section III, Class 1 design requirements. Environmentally-adjusted fatigue usage factors (CUF_{en}) were computed in accordance with the requirements specified in NUREG/CR-6909 for all materials.

An environmental fatigue correction factor was determined for each material within the analyzed component that contacts reactor coolant to assure the limiting case was analyzed. The fatigue design curves provided in NUREG/CR-6909 were used to determine the allowable numbers of cycles for all stainless steel and nickel alloy materials. The resulting CUF_{en} values do not exceed the design Code limit of 1.0. The feedwater nozzles have been qualified for 51 years. Corrective action will be required prior to reaching the limit of 1.0 for these nozzles. Maintaining the cumulative cycle counts below the cycle limits assures that the CUF value does not exceed the Code design limit of 1.0, including environmental effects where applicable.

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 increased transient severity 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 assure the liming locations within each Class 1 system and RPV component are evaluated for reactor water environmental effects.

NUREG-1801 Consistency

The Fatigue Monitoring program is an existing program that 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 enhancement will be implemented in the following program elements:

1. Monitor additional plant transients that are significant contributors to fatigue usage and impose administrative transient cycle limits corresponding to the limiting numbers of cycles analyzed in the environmental fatigue calculations. **Program Elements Affected: Preventive Action (Element 2), Parameters Monitored/Affected (Element 3), and Corrective Actions (Element 6)**

Operating Experience

The following examples of operating experience provide objective evidence that the Fatigue Monitoring program will be effective in assuring that the intended functions of components managed by this program 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 LGS 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 (RWCU) 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. Cracking in the Control Rod Drive Return Line (CRDRL) nozzle has occurred in several BWR plants as described in NUREG-0619 and NRC Information Notice 2004-08. In response to the concerns described in NUREG-0619, the LGS design eliminated the use of a CRD return line prior to commercial operations and the CRDRL nozzle was capped. These changes significantly reduced the number of thermal cycles and the likelihood of fatigue cracking in the nozzle. The CRDRL nozzles on both units have been examined several times since the plant started operation in 1986 with no flaws detected. This example provides objective evidence that industry experience and guidance is incorporated into the plant design.

3. During the Unit 2 spring 2005 refueling outage, snubber SA3 in recirculation piping loop A was found to have a cold setting that was out of tolerance and locked in the hot position. The previous snubber inspection had been performed in 1997 when the snubber was satisfactory. The locked-up snubber prevents the free movement of the piping and thereby creates higher thermal expansion stresses in the piping components. The snubber was replaced, but a stress and fatigue evaluation was also performed for the affected piping to account for the potential increase in loadings between the 1997 inspection and the 2005 inspection. The updated fatigue analysis showed that the maximum fatigue usage factor meets the design requirements. This reanalysis provides evidence that when changes in loading conditions are discovered, the changes are reanalyzed to assure that fatigue usage does not exceed the design limit of 1.0.

4. During the Unit 1 2010 refueling outage, snubber DCA-319-H002 on the core spray system was tested and found inoperable, resulting in increased drag loads on the piping. The previous snubber inspection had been performed in 1992. The snubber was replaced, and stress and fatigue analyses were performed for the affected piping and for the RPV core spray nozzle N5A to account for the potential increased loadings from 1992 to 2010. The updated fatigue analyses resulted in a CUF value that meets the design requirements. The piping was shown to meet the design basis loading requirements. This reanalysis provides evidence that when changes in loading conditions are discovered, the changes are reanalyzed to assure that fatigue usage does not exceed the design limit of 1.0.

5. In 2009, inconsistencies were identified in the cumulative cycle counts shown on the reactor vessel thermal transient monitoring data sheets prepared for Units 1 and 2. The issues were historical and primarily associated with incorrect transferring of cumulative cycle count totals from one quarterly report to the next, resulting in discrepancies between the individual event occurrences and the cumulative cycle counts. These errors did not have an operational or design impact, as the overall magnitude of the issue was small. The cumulative totals for each affected transient type were reconciled. To prevent future errors of this type, procedures were revised to include improved human factors. This example demonstrates that program assessments are conducted, and deficiencies are addressed as part of the corrective action program.

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. Therefore, there is confidence that continued implementation of Fatigue Monitoring program will effectively identify degradation prior to loss of intended function.

Conclusion

The existing Fatigue Monitoring program will provide reasonable assurance that the cumulative fatigue damage 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.3.1.2 Environmental Qualification (EQ) of Electric Components

Program Description

The Environmental Qualification (EQ) of Electric Components is an existing 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 important to safety which are composed of various polymeric and metallic materials. 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.

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 continued implementation of 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 March 2004, it was identified during preparation for surveillance testing that an installed Unit 1 squib valve had exceeded its qualified life. This issue occurred because the replacement due dates for these squib valves were set without incorporating the manufacturer expiration dates. The extent of condition evaluation for components with similar manufacturer end of life dates did not identify additional occurrences; this issue with squib valve expiration dates was a one-time occurrence. Corrective actions also addressed rescheduling of associated replacements to align with manufacturer expiration dates and changes to the replacement criteria to prevent recurrence. This operating experience provides objective evidence that if issues are discovered with environmental qualification replacement tasks, the corrective action program will identify the causes and implement corrective actions to prevent recurrence demonstrating that the Environmental Qualification (EQ) of Electric Components program will adequately manage electrical components subject to the requirements of environmental qualification through the period of extended operation.

2. In August 2005, during increased frequency stroking of Unit 2 core spray pump unit cooler valves, it was identified that a valve would not open fully. To maintain area temperatures assumed in environmental qualification analyses, a redundant unit cooler was placed in service to maintain environmental qualification temperatures for the associated core spray pump. Corrective maintenance returned the unit cooler valve to service. This issue provides objective evidence that environmental conditions required to maintain equipment qualification are understood and incorporated into daily activities. This substantiates that the Environmental Qualification (EQ) of Electric Components program, as it is institutionalized in plant practices and procedures, will adequately manage electrical components subject to the requirements of environmental qualification through the period of extended operation.

3. In September 2006, a periodic Focused Area Self-Assessment was completed for the Environmental Qualification (EQ) of Electric Components program. It was concluded that this program continues to meet regulatory requirements for documentation, administrative controls, preventive maintenance, procurement, receipt inspection, and personnel knowledge and performance. Improvement recommendations were made for motor operator installation techniques, installation of motor operator T-drains, binder documentation, conversion of binders to an electronic format, and documenting the applicability of procurement requirement source documents. 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 January 2009, it was identified that there were some mis-alignments between daily surveillance logs that collect Reactor Enclosure and Turbine Enclosure temperatures and the specification for environmental service conditions. Areas with discrepancies included Reactor Water Clean-up pump rooms, Residual Heat Removal compartments and Turbine Enclosure Main Steam tunnel areas. Corrective actions included temperature variation evaluations on environmental qualification equipment in the affected areas with subsequent adjustments to component qualified life and preventive maintenance. The surveillance log procedures were also enhanced to clarify temperature limits. This operating experience provides objective evidence that existing Environmental Qualification (EQ) of Electric Components program and the corrective action program effectively identify and correct observed temperature variations and procedure or specification misalignments as part of ongoing plant activities.

The operating experience of the Environmental Qualification (EQ) of Electric Components program did not show any 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. Therefore, there is confidence that continued implementation of the Environmental Qualification (EQ) of Electric Components program will prevent failure prior to refurbishment, replacement or requalification.

Conclusion

The existing Environmental Qualification (EQ) of Electric Components program provides reasonable assurance that various aging effects will be adequately managed so that the intended function of electric components subject to the requirements of environmental qualification are maintained consistent with the current licensing basis during the period of extended operation.

APPENDIX C

(This Appendix is not used).

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APPENDIX D Technical Specification Changes

10 CFR 54.22 requires that an application for license renewal include any Technical Specification changes or additions necessary to manage the effects of aging during the period of extended operation.

No 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.