Progress Energy

Crystal River Unit 3

License Renewal Application

[This page intentionally blank]

PREFACE

The following paragraphs describe the content of the Crystal River Unit 3 (CR-3) License Renewal Application consisting of Chapters 1 through 4 and Appendices A through E.

Chapter 1 provides the administrative information required by Sections 54.17 and 54.19 of 10 CFR Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

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

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

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

Appendix A, the Final Safety Analysis Report Supplement, provides a summary description of the programs and activities for managing the effects of aging during the period of extended operation. A summary description of the evaluation of Time-Limited Aging Analyses for the period of extended operation is also included.

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

Appendix C is not used.

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

Pursuant to 10 CFR 54.23, a supplement to the Environmental Report is provided in Appendix E, entitled, "Applicant’s Environmental Report – Operating License Renewal Stage."

ACRONYMS AND ABBREVIATIONS

AB	Auxiliary Building
AC	Alternating Current
ACI	American Concrete Institute
ACRS	Advisory Committee on Reactor Safeguards
ACSR	Aluminum Conductor Steel Reinforced
AEM	Aging Effect/Mechanism
AERM	Aging Effects Requiring Management
AISC	American Institute of Steel Construction
AMP	Aging Management Program
AMR	Aging Management Review
AMSAC	ATWS Mitigating System Actuation Circuitry
ANSI	American National Standards Institute
AOO	Anticipated Operational Occurrence
API	American Petroleum Institute
AREVA	AREVA NP (formerly Framatome ANP) a supplier of nuclear plant services
ART	Adjusted Reference Temperature
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
AST	Alternative Source Term
ASTM	American Society for Testing and Materials
ATWS	Anticipated Transient Without Scram
AWS	American Welding Society
B&PV	Boiler and Pressure Vessel
B&WOG	Babcock & Wilcox Owners Group
BEST	Backup Engineered Safeguards Transformer
BMV	Bare Metal Visual
BTP	Branch Technical Position
BWR	Boiling Water Reactor
BWST	Borated Water Storage Tank
CA	Chemical Addition
CAP	Corrective Action Program
CASS	Cast Austenitic Stainless Steel
CC	Control Complex
CCHE	Control Complex Habitability Envelope
CD & FW	Condensate and Feedwater
CLB	Current Licensing Basis
CMAA	Crane Manufacturers Association of America
CP&L	Carolina Power & Light Company, a Progress Energy Company
CR-3	Crystal River Unit 3
CRD	Control Rod Drive
CRDM	Control Rod Drive Mechanism
CRGT	Control Rod Guide Tube
CS	Carbon Steel
CST	Condensate Storage Tank
CUF	Cumulative Usage Factor
C_VUSE	Upper Shelf Energy determined by Charpy V-Notch Test Results

ACRONYMS AND ABBREVIATIONS

DBA	Design Basis Accident
DBE	Design Basis Earthquake, Design Basis Event
DC	Direct Current
DH	Decay Heat
DOR	Division of Operating Reactors (NRC)
ECCS	Emergency Core Cooling System
EDB	(PassPort) Equipment Database
EDG	Emergency Diesel Generator
EFIC	Emergency Feedwater Initiation and Control
EFP-3	Emergency Feedwater Pump No. 3
EFPB	Emergency Feedwater Pump Building
EFPY	Effective Full Power Years
EFW	Emergency Feedwater
EHC	Electro-Hydraulic Control
EMA	Equivalent Margin Analysis
EOL	End of Life
EP	Ethylene Propylene
EPDM	Ethylene Propylene Diene Monomer
EPR	Ethylene Propylene Rubber
EPRI	Electric Power Research Institute
EQ	Environmental Qualification
EQML	Environmental Qualification Master List
ER	Environmental Report
ES	Engineered Safeguards
ESF	Engineered Safety Features
ETFE	Ethylene Tetrafluoroethylene
FAC	Flow Accelerated Corrosion
Fen	Environmental Fatigue Factor
FEP	Fluorinated Ethylene Propylene
FERC	Federal Energy Regulatory Commission
FHA	Fire Hazards Analysis
FHB	Fuel Handling Building
FIV	Flow-Induced Vibrations
FMH	Flexible Metal Hose
FO	Fuel Oil
FOL	Facility Operating License
FOST	Fuel Oil Storage Tank
FP	Fire Protection
FPC	Florida Power Corporation, a Progress Energy Company
FSAR	Final Safety Analysis Report
ft.	foot, feet
FW	Feedwater
GALL	Generic Aging Lessons Learned (the GALL Report is NUREG-1801)
GDC	General Design Criteria
GL	Generic Letter
GSI	Generic Safety Issue
HELB	High Energy Line Break

ACRONYMS AND ABBREVIATIONS

HEPA	High Efficiency Particulate Air
HMWPE	High Molecular Weight Polyethylene
HPI/MU	High Pressure Injection//Makeup
HTK	High Temperature Kerite
HVAC	Heating, Ventilating, and Air Conditioning
I&C	Instrumentation and Control
IA	Instrument Air
IASCC	Irradiation Assisted Stress Corrosion Cracking
IB	Intermediate Building
ICC	Inadequate Core Cooling
ICS	Integrated Control System
IE	Inspection and Enforcement (former NRC Office of Inspection and Enforcement)
IEEE	Institute Of Electrical And Electronic Engineers
IGSCC	Intergranular Stress Corrosion Cracking
ILRT	Integrated Leak Rate Test (Containment Type A Test)
IN	Information Notice
in.	inch, inches
INPO	Institute for Nuclear Power Operations
IPA	Integrated Plant Assessment (10 CFR 54.21(a))
IPCEA	Insulated Power Cable Engineers Association
IR	Insulation Resistance
ISI	In-Service Inspection
Kerite FR	Proprietary cable insulation by Kerite Corporation
KV	Kilovolt
LAS	Low-Alloy Steel
LBB	Leak-Before-Break
LER	Licensee Event Report
LHSI	Low Head Safety Injection
LiOH	Lithium Hydroxide
LLRT	Local Leak Rate Test
LMFW	Loss of Main Feedwater
LO	Lube Oil
LOCA	Loss of Coolant Accident
LOOP	Loss of Offsite Power
LPI	Low Pressure Injection
LR	License Renewal
LRA	License Renewal Application
LR-ISG	License Renewal Interim (NRC) Staff Guidance
LTOP	Low-Temperature Overpressure Protection
LTOPS	Low-Temperature Overpressure Protection System
MCB	Main Control Board
MCC	Motor Control Center
MD	Miscellaneous Drains
MEB	Metal Enclosed Bus
MeV	Million Electron Volts
MFP	Main Feedwater Pump
MFW	Main Feedwater

ACRONYMS AND ABBREVIATIONS

MIC	Microbiologically Influenced Corrosion
MIRVP	Master Integrated Reactor Vessel Material Surveillance Program
MR	Maintenance Rule (10 CFR 50.65)
MSLB	Main Steam Line Break
MUT	Makeup Tank
NDE	Nondestructive Examination
NDTT	Nil-Ductility Transition Temperature
NEI	Nuclear Energy Institute
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
Ni	Nickel
NPS	Nominal Pipe Size
NRC	Nuclear Regulatory Commission
NSCCC	Nuclear Service Closed-Cycle Cooling
NSR	Non-Safety Related
NSSS	Nuclear Steam Supply System
NUREG	Designation of publications prepared by the NRC staff
ODSCC	Outside Diameter Stress Corrosion Cracking
OE	Operating Experience
OPT	Offsite Power Transformer/Offsite Power Termination
OTSG	Once-Through Steam Generator
PASS	Post-Accident Sampling System
PE	Polyethylene
PEF	Progress Energy Florida, Inc. a subsidiary of Progress Energy, Inc.
pH	Concentration of Hydrogen Ions
PM	Preventive Maintenance
PORV	Power-Operated Relief Valve
psid	pounds per square inch differential
P-T	Pressure-Temperature
PTLR	Pressure-Temperature Limits Report
PTS	Pressurized Thermal Shock
PVC	Polyvinyl Chloride
PVDF	Polyvinylidene Fluoride
PWR	Pressurized Water Reactor
PWSCC	Primary Water Stress Corrosion Cracking
QA	Quality Assurance
RB	Reactor Building
RAI	Request for Additional Information
RCP	Reactor Coolant Pump
RCPB	Reactor Coolant Pressure Boundary
RCS	Reactor Coolant System
RFO	Refueling Outage
RG	Regulatory Guide
RPV	Reactor Pressure Vessel
RTE	Resistance Temperature Element
RT_{NDT}	Reference Temperature, Nil-Ductility Transition
$RT_{NDT(U)}$	Reference Temperature, Nil-Ductility Transition (Unirradiated)

ACRONYMS AND ABBREVIATIONS

RV	Reactor Vessel
RVCH	Reactor Vessel Closure Head
RVI	Reactor Vessel Internals
SBO	Station Blackout
SC	Structure/Component (10 CFR 54.21(a)(1))
SCC	Stress Corrosion Cracking
SE	Safety Evaluation
SER	Safety Evaluation Report
SGTR	Steam Generator Tube Rupture
SIT	Structural Integrity Test
SPDS	Safety Parameter Display System
SR	Silicone Rubber
SRP	Standard Review Plan
SRP-LR	Standard Review Plan for License Renewal (the SRP-LR is NUREG-1800)
SS	Stainless Steel
SSC	Systems, Structures, and Components (10CFR 54.4(a))
SSE	Safe Shutdown Earthquake
SSHT	Surveillance Specimen Holder Tube
TAC	Technical Assignment Control (internal NRC work management tool)
TB	Turbine Building
TGSCC	Trans-Granular Stress Corrosion Cracking
TID	Total Integrated Dose
TLAA	Time-Limited Aging Analysis
TRXLPE	Tree-Retardant Cross-Linked Polyethylene
TSC	Technical Support Center
TSP-C	Trisodium Phosphate Dodecahydrate
UAT	Unit Auxiliary Transformer
UCC	Underclad Cracking
UHS	Ultimate Heat Sink
UPS	Uninterruptible Power Supply
USAS	United States of America Standards
USE	Upper-Shelf Energy
UT	Ultrasonic Test
UV	Ultraviolet
VAC	Volts alternating current
VDC	Volts direct current
VHP	Vessel Head Penetration
WANO	World Association of Nuclear Operators
WCAP	Westinghouse Commercial Atomic Power
wg	water gauge
WGDT	Waste Gas Decay Tank
XLP, XLPE	Cross-linked Polyethylene
XLPO	Cross-linked Polyolefin

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

[This page intentionally blank]

1.0 ADMINISTRATIVE INFORMATION

1.1 PURPOSE AND GENERAL INFORMATION

In accordance with the requirements of Part 54 of Title 10 of the Code of Federal Regulations (10 CFR 54), Florida Power Corporation, doing business as Progress Energy Florida, Inc., a subsidiary of Progress Energy, Inc., has prepared this application to provide the technical and environmental information required for renewal of Facility Operating License No. DPR-72 for the Crystal River Unit 3 Nuclear Generating Plant (CR-3). This application supports License Renewal for an additional 20-year period beyond the end of the current license term of Facility Operating License DPR-72. The end of the current license term is midnight December 3, 2016. The technical information consists of (1) an Integrated Plant Assessment, as defined in 10 CFR 54.21(a), (2) an evaluation of time-limited aging analyses, as defined in 10 CFR 54.21(c), (3) a supplement to the CR-3 Final Safety Analysis Report (FSAR), as required by 10 CFR 54.21(d), and (4) environmental information, as required by 10 CFR 54.23. The environmental information is provided as a separate appendix to the application, Appendix E, entitled “Applicant’s Environmental Report – Operating License Renewal Stage.”

This application and supporting environmental report are intended to provide sufficient information for the Nuclear Regulatory Commission (NRC) staff to complete its technical and environmental reviews and allow the NRC to make the finding required by 10 CFR 54.29 in support of the issuance of a renewed operating license for CR-3. The following is the application filing and content information required by 10 CFR 54.17 and 10 CFR 54.19.

1.1.1 NAME OF APPLICANT

Florida Power Corporation, doing business as,
Progress Energy Florida, Inc.

1.1.2 ADDRESS OF APPLICANT

Florida Power Corporation,
d/b/a Progress Energy Florida, Inc.
299 First Avenue North
St. Petersburg, FL 33701

Address of Crystal River Unit 3:

Progress Energy Florida, Inc.
Crystal River Unit 3
15760 West Powerline St.
Crystal River, FL 34428

1.1.3 OCCUPATION OF APPLICANT

Florida Power Corporation, doing business as, Progress Energy Florida, Inc. (hereinafter referred to as the Company), is a corporation primarily engaged in the generation, transmission, distribution, and sale of electricity in the state of Florida. The Company serves approximately 1.7 million customers. The company is headquartered in St. Petersburg, FL, and serves a territory encompassing over 20,000 square miles including the cities of St. Petersburg, Clearwater, greater Tallahassee, and the central Florida area surrounding Orlando.

1.1.4 ORGANIZATION AND MANAGEMENT OF APPLICANT

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

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

Director	Address
William D. Johnson	St. Petersburg, FL
Michael A. Lewis	St. Petersburg, FL
Jeffrey J. Lyash	St. Petersburg, FL
John R. McArthur	St. Petersburg, FL
Mark F. Mulhern	St. Petersburg, FL
Paula J. Sims	St. Petersburg, FL
Lloyd M. Yates	St. Petersburg, FL

Principal Officers	Address
William D. Johnson Chairman Progress Energy Florida	299 First Avenue North St. Petersburg, FL 33701-3324
Jeffrey J. Lyash President & Chief Executive Officer Progress Energy Florida	299 First Avenue North St. Petersburg, FL 33701-3324

Principal Officers	Address
Michael Lewis Senior Vice President Progress Energy Florida	299 First Avenue North St. Petersburg, FL 33701-3324
John R. McArthur Senior Vice President Progress Energy Florida	299 First Avenue North St. Petersburg, FL 33701-3324
Mark F. Mulhern Senior Vice President & Chief Financial Officer Progress Energy Florida	299 First Avenue North St. Petersburg, FL 33701-3324
Jim Scarola Senior Vice President & Chief Nuclear Officer Progress Energy Florida	299 First Avenue North St. Petersburg, FL 33701-3324
Paula Sims Senior Vice President Progress Energy Florida	299 First Avenue North St. Petersburg, FL 33701-3324
Robert A. Glenn General Counsel Progress Energy Florida	299 First Avenue North St. Petersburg, FL 33701-3324
Jeffrey M. Stone Chief Accounting Officer Progress Energy Florida	299 First Avenue North St. Petersburg, FL 33701-3324

1.1.5 CLASS AND PERIOD OF LICENSE SOUGHT

The Company requests renewal of the Class 104b Facility Operating License No. DPR-72 for CR-3 for a period of 20 years beyond the expiration of the current license. Approval of this License Renewal request would extend the operating license for CR-3 from midnight December 3, 2016, until midnight December 3, 2036. The facility would continue to be known as the Crystal River Unit 3 Nuclear Generating Plant, and would continue to generate electric power during the period of extended operation. The Company also requests renewal of the source, byproduct, and special nuclear material licenses that are combined in the current operating license.

1.1.6 ALTERATION SCHEDULE

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

1.1.7 CHANGES TO THE STANDARD INDEMNITY AGREEMENT

10 CFR 54.19(b) requires that License Renewal applications include, "…conforming changes to the standard indemnity agreement, 10 CFR 140.92, Appendix B, to account for the expiration term of the proposed renewed license." Indemnity Agreement No. B-54 for CR-3 states in Article VII that the agreement shall terminate at the time of expiration of that license specified in Item 3 of the Attachment to the agreement. Item 3 of the attachment to the Indemnity Agreement, as amended, lists operating license DPR-72. The Company requests that conforming changes be made to the indemnity agreement, and/or the Attachment to the agreement, as required, to specify the extension of the agreement until the expiration date of the renewed CR-3 operating license as sought in this application.

1.1.8 RESTRICTED DATA AGREEMENT

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

1.2 DESCRIPTION OF CRYSTAL RIVER UNIT 3

The CR-3 site is located on the Gulf of Mexico in Citrus County, FL. The city of Tampa, FL is approximately 70 miles to the south.

The CR-3 Nuclear Steam Supply System (NSSS) is a pressurized water reactor type. It uses chemical shim and control rods for reactivity control and generates steam with a small amount of superheat in two Once-Through Steam Generators. The NSSS and original nuclear fuel were supplied by the Babcock & Wilcox Company.

Major plant structures include the Reactor Building, Auxiliary Building, Control Complex, Intermediate Building, Emergency Diesel Generator Building, Emergency Feedwater (EFW) Pump Building, Dedicated EFW Tank Enclosure Building, Intake Structure, and Turbine Building.

The Reactor Building is a steel-lined, post-tensioned concrete structure in the form of a vertical right-cylinder with a dome roof and a flat base.

Additional descriptive information about CR-3 systems, structures, and components is provided in later chapters of this application.

1.3 TECHNICAL INFORMATION REQUIRED FOR AN APPLICATION

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

In addition to the technical information, 10 CFR 54.22 requires applicants to submit any Technical Specification changes or additions necessary to manage the effects of aging during the period of extended operation. As noted in Appendix D, no changes to the CR-3 Technical Specifications are required to support this application.

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

The IPA, as defined by 10 CFR 54.3, is a licensee assessment that demonstrates that a nuclear power plant’s structures and components requiring aging management review in accordance with 10 CFR 54.21(a) for License Renewal have been identified. The IPA also demonstrates that the effects of aging on the functionality of such structures and components will be managed to maintain the CLB during the period of extended operation. The CR-3 IPA includes:

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

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

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

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

The IPA for License Renewal, along with other information necessary to document compliance with 10 CFR 54, is maintained in an auditable and retrievable form, in accordance with 10 CFR 54.37(a). The IPA is documented with site-specific documents and calculations that were generated in accordance with the CR-3 Quality Assurance Program.

1.4 CURRENT LICENSING BASIS CHANGES DURING NRC REVIEW

Each year, following the submittal of the CR-3 License Renewal Application and at least three months before the scheduled completion of the NRC review, the Company will submit amendments to the application pursuant to 10 CFR 54.21(b). The amendments will identify any changes to the CLB that materially affect the contents of the License Renewal Application, including the FSAR Supplement and any other aspects of the Application.

1.5 ADDITIONAL RECORDS AND RECORD KEEPING REQUIREMENTS

In accordance with 10 CFR 54.37(b), the Company will incorporate into updates to the CR-3 FSAR, as required by 10 CFR 50.71(e), any newly identified systems, structures, and components (SSCs) that would have been subject to an aging management review or evaluation of time-limited aging analyses in accordance with 10 CFR 54.21 and describe how the effects of aging will be managed such that the intended functions of the SSCs are maintained during the period of extended operation.

As stated in the discussion of 54.37(b) in the Statements of Consideration for the revised License Renewal regulations (60 FR 22461, May 8, 1995), "[t]he Commission believes that it is important to note that the SSCs discussed in 54.37(b) are those *newly identified* SSCs that would have been subject to an aging management review in the License Renewal process. If identified as part of the License Renewal process, information concerning the aging management for these SSCs would have been contained in the application for License Renewal." Additional guidance for compliance with 10 CFR 54.37(b) is contained in NRC Regulatory Issue Summary (RIS) 2007-16, "Implementation of the Requirements of 10 CFR 54.37(b) for Holders of Renewed Licenses."

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

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

Scoping and screening methodologies are described in Section 2.1. The results of applying the methodology to identify the SSCs within the scope of license renewal (scoping) are contained in Section 2.2. The results of applying the methodology for identification of SCs subject to an aging management review (screening) are contained in Section 2.3 for mechanical systems, Section 2.4 for structures, and Section 2.5 for electrical and instrumentation and control (I&C) systems. The screening process included identification of the intended functions of the structures and components that are subject to AMR. Table 2.1-1 identifies the meanings of the intended functions and defines the abbreviations used on the screening results tables provided in Sections 2.3, 2.4, and 2.5, and on the AMR results tables provided in Chapter 3.

The Crystal River Unit 3 (CR-3) license renewal review methodology is consistent with the approach recommended in NEI 95-10, “Industry Guideline for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule,” Revision 6, Nuclear Energy Institute, June 2005 (hereinafter referred to as NEI 95-10) with an exception as noted in Section 3.0 of this application. The NEI 95-10 methodology consists of three processes: scoping, screening, and AMR. These processes have been implemented in accordance with the CR-3 Quality Assurance Program.

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

[This page intentionally blank]

2.1 SCOPING AND SCREENING METHODOLOGY

Scoping is the initial step in the CR-3 License Renewal technical evaluation methodology. Scoping is performed to identify systems, structures, or components (SSCs) that perform intended functions within the scope of License Renewal as required by 10 CFR 54.4. The scoping methodology is described in Subsection 2.1.1 below.

Screening is the second step of the CR-3 technical evaluation methodology and addresses the requirements of an IPA defined in 10 CFR 54.21(a). The CR-3 screening process includes: (1) a review of the systems and structures identified as in scope for License Renewal to identify the specific components of those structures and systems that support the functions of 10 CFR 54.4, and (2) a review of the components and structural components to identify those that satisfy the criteria of 10 CFR 54.21(a)(1). The screening process identifies those structures and components that are subject to an AMR. The screening process is described in Subsection 2.1.2.

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

The NRC staff has identified several issues for which additional regulatory clarification was found necessary; these are referred to as License Renewal Interim Staff Guidance (LR-ISG) issues. Subsection 2.1.4 discusses how applicable LR-ISG issues were addressed within the CR-3 License Renewal review.

2.1.1 SCOPING

CR-3 Scoping Process Overview

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

> *(a) Plant systems, structures, and components within the scope of this part are—*
>
> (1) *Safety related systems, structures, and components which are those relied upon to remain functional during and following design-basis events (as defined in 10 CFR 50.49 (b)(1)) to ensure the following functions—*

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

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

(3) *All systems, structures, and components relied on in safety analyses or plant evaluations to perform a function that demonstrated compliance with the Commission's regulation for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), pressurized thermal shock (10 CFR 50.61), anticipated transients without scram (10 CFR50.62), and station blackout (10 CFR 50.63).*

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

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

The process of determining which systems and structures are within the scope of License Renewal involved a review of the CR-3 Final Safety Analysis Report (FSAR) and other documents containing descriptive and functional information. The FSAR contains information such as the design bases, design codes and standards, safety classifications, design evaluations, descriptions, and safety analyses applicable to plant systems and structures. This information was used in conjunction with other Current Licensing Basis (CLB) information and plant documents, such as Design Basis Documents, to determine if a particular system or structure function aligns with the criteria of 10 CFR 54.4(a)(1) through (a)(3). The CR-3 scoping process included an evaluation of the PassPort Equipment Data Base (PassPort EDB or the EDB) to determine its potential for use as a scoping tool for License Renewal. The PassPort EDB identifies the items to which the Quality Assurance Program applies. The CR-3 scoping process also utilized discipline-specific reviews to ensure that civil and electrical commodities associated with system intended functions were included in the scope of License Renewal.

In addition, topical evaluations were performed to identify additional systems within the scope of License Renewal. Topical evaluations addressed the following areas and included a review of applicable CLB documentation:

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

No topical evaluation was required for environmental qualification (EQ); because the equipment required to perform an EQ function is identified at the component level within PassPort EDB.

The CR-3 EDB scoping process was consistent with the guidance found in NEI 95-10, with exceptions consistent with the CR-3 licensing basis as noted below. Scoping was performed on a component level to identify the systems and structures meeting the criteria of 10 CFR 54.4, and was intended to be conservative and inclusive. A review was performed of CR-3 plant systems to identify components having functional requirements consistent with License Renewal scoping criteria. Each system having one or more components that satisfied scoping criteria was brought into the scope of License Renewal. There may be considerable overlap in License Renewal scoping criteria, such that components that satisfy one criterion might also be used to satisfy another. For example, components credited in 10 CFR 54.4(a)(3) regulated events, such as FP, might also satisfy 10 CFR 54.4(a)(2) criteria. While it was not necessary or intended to identify each License Renewal scoping criteria that might be associated with a given component, it was intended to identify all the components that are in the scope of License Renewal and the functional basis for their inclusion. The following discussions address the scoping evaluations that were performed to identify systems in the scope of License Renewal.

The PassPort EDB contains component level information, based on a review of plant design and licensing requirements, and maintained in a 10 CFR 50, Appendix B environment. This component level data was conservatively evaluated against 10 CFR 54.4 criteria to facilitate component level scoping. Components having predefined attributes consistent with License Renewal scoping criteria were categorically identified as being in scope. PassPort EDB was used to identify safety-related components meeting 10 CFR 54.4(a)(1), components having potential spatial interactions consistent with the criteria of 10 CFR 54.4(a)(2), and components credited in regulated events described in 10 CFR 54.4(a)(3). The scoping process uses the EDB as a tool to facilitate an efficient component level scoping process. This is considered a beginning point for the overall scoping effort; the scoping process does not rely solely on the EDB to establish scoping boundaries, nor does it exclude items from scope based solely on EDB data. Any component not included in scope based on consideration of EDB data is subject to further reviews to ensure a comprehensive result.

The initial step in the scoping process was to compile a list of SSCs for scoping. Identification of systems and structures that fall within the scope of the Rule at CR-3 was based on component level reviews, with the results of these reviews translated to associated systems and structures. The PassPort EDB lists each CR-3 system by a unique system identifier, and components within a given system are assigned a unique EDB component identification (tag) number. CR-3 plant systems may be considered to be mechanical, civil, and electrical based on the components that comprise them and system design/functional requirements. The CR-3 scoping process addressed each CR-3 system irrespective of design discipline.

While piping components such as valves, tanks, and pumps are tagged in PassPort EDB, piping itself is not assigned tag numbers and uniquely identified. Similarly, heating, ventilation and air conditioning (HVAC) Systems include tagged components for fans, dampers, etc., but no tag numbers are assigned to ductwork. To address this, evaluations were made of piping and HVAC systems based on the attributes associated with tagged piping/HVAC components. Piping commodities were created for systems having piping components, and these were conservatively assumed to satisfy any License Renewal scoping criteria associated with those components. A similar approach was taken to the development of ductwork commodities in HVAC Systems. Additional reviews were performed based on plant walkdowns, system design and functional requirements, and additional commodities/scoping attributes were assigned as appropriate.

The process of determining the intended functions for a system began with the review of FSAR. The FSAR contains information such as the design bases, compliance with codes and standards, safety classifications, design evaluations, descriptions of system operation, descriptions of system interdependencies, and safety analyses. This information was used in conjunction with other information retrieved from sources such as Design Basis Documents, docketed correspondence, and procedures to produce the system/structure intended functions. As an adjunct to this evaluation, a review of the component level intended functions derived from PassPort EDB classifications was used to ensure that all system level intended functions were captured. The PassPort EDB review identified some system intended functions based on pertinent component-level parameter definitions. The topical calculations for ATWS, FP, PTS, 10 CFR 54.4(a)(2) Scoping, and SBO also provide input into system intended functions. The License Renewal system level intended functions compiled from the PassPort EDB and topical calculations were used in conjunction with the review of the FSAR, Design Basis Documents, and docketed correspondence to obtain the full set of system intended functions.

In some cases the scoping criteria of 10 CFR 54.4 are more restrictive than the scoping results obtained by applying the quality and functional classification designations from PassPort EDB. The CR-3 scoping process allowed for refining of results on a case-by-case basis to exclude components that are outside of License Renewal scoping criteria.

Examples of these exclusions include components that provide defense in depth beyond those required to perform a function credited for a Station Blackout event, FP components located in outbuildings that are not required to support the regulatory requirements for FP, and components associated with plant physical security or emergency preparedness.

The License Renewal scoping process requires system function evaluation boundaries to be identified and defines these boundaries as being those mechanical components required for successful completion of a given License Renewal intended function. These components may be identified by highlighted flow diagrams, descriptive text, or component lists in instances where databases or other plant documents are used to define the boundaries of a given function. License Renewal scoping drawings have been developed to facilitate NRC staff review by depicting mechanical components that support system intended functions and, therefore, are within the scope of License Renewal. Applicable drawings are identified by system in Section 2.3.

The CR-3 Civil/Structural scoping process augmented the system scoping process to ensure all structures within the scope of License Renewal were captured. While some structures/ structural components are listed within CR-3 systems, PassPort EDB does not provide a distinct listing of CR-3 structures. To address this situation, structures were identified based on a review of the FSAR, Design Basis Documents, Maintenance Rule Database, PassPort EDB, and License Renewal topical scoping evaluations.

In scoping of structures, the primary consideration was that any structure that houses or provides physical/functional support for components within the scope of License Renewal is itself in the scope of License Renewal. Component location information in the PassPort EDB was used to identify structures that house or support License Renewal components. Structure intended functions were then associated with the intended functions of the components contained therein. The civil intended functions for each specific structure were logically associated with the intended functions of the components located within. Based on this review, a listing of structures was compiled that encompasses the structural elements required for functional support of systems/components in the scope of License Renewal.

The following subsections provide a detailed discussion of the scoping process applied to identify SSCs within the scope of License Renewal pursuant to the requirements of 10 CFR 54.4(a).

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

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

1. The integrity of the reactor coolant pressure boundary;

2. The capability to shut down the reactor and maintain it in a safe shutdown condition; or

3. The capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposure comparable to the guidelines in §50.34(a)(1), §50.67(b)(2), or §100.11 of this chapter as applicable.

A comparison of the License Renewal scoping criteria for safety related SSCs in 10 CFR 54.4(a)(1) versus that used to define safety related components in PassPort EDB finds the only difference applicable to CR-3 pertains to the use of 10 CFR 50.67(b)(2). This section of the Code of Federal Regulations describes the use of alternate source terms (ASTs) in radiological evaluations. CR-3 has adopted the use of ASTs, and the requirements of 10 CFR 50.67(b)(2) are applicable to License Renewal scoping. A review of CLB information for AST shows that the components credited with accident response and mitigation of radiological exposures in an accident are consistent with that of previous 10 CFR 100.11 evaluations, such that no changes to plant design or procedures were needed. It follows that CR-3 components identified in PassPort EDB as safety related meet the criteria of 10 CFR 54.4(a)(1) and are in the scope of License Renewal unless specific evaluation and justification is provided to exclude them.

The CR-3 Scoping Process took exception to the guidance of NEI 95-10 Scoping Criteria for 10 CFR 54.4(a)(1) relative to certain SSCs installed in the Turbine Building (TB). The CR-3 FSAR designates the TB as a Class III Structure, denoting it as non-seismically designed and not required to prevent or mitigate an accident. The TB exterior walls are constructed of sheet metal, and the building does not afford protection from tornado or turbine missiles. Flood protection measures in the building are provided only with regard to preventing flooding of adjacent safety related structures, not the TB itself. Nonetheless, CR-3 EDB data identified a limited number of components installed in the TB and assigned a quality classification or other EDB parameter associated with functions important to safety. Based on a review of design and licensing bases, it was concluded that these SSCs do perform a function important to safety, but do not satisfy the design requirements in FSAR Section 1.4 (Principal Architectural and Design Criteria), Criterion 2, for equipment essential to safety. Accordingly, these SSCs were included in scope under 10 CFR 54.4(a)(2). Since NEI 95-10 does not provide specific guidance for the situation where a function important to safety could be accomplished by non-essential equipment, this is considered an exception to the guidance of NEI 95-10.

Based on the above, the scoping process to identify safety related SSCs for CR-3 License Renewal satisfies the criteria in 10 CFR 54.4(a)(1).

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

10 CFR 54.4(a)(2) states that SSCs within the scope of License Renewal include non-safety related SSCs whose failure could prevent satisfactory accomplishment of any of the functions identified for safety related SSCs.

CR-3 has made use of the CLB-based information regarding quality classification, functional data, and regulatory requirement data contained in PassPort EDB to identify SSCs that have functional or physical interactions with safety related SSCs. Non-safety related components do not satisfy the scoping criteria of 10 CFR 54.4(a)(1), but are still subject to consideration against (a)(2) and (a)(3) in topical License Renewal scoping evaluations. Functional classifications have been assigned to non-safety related components and documented in PassPort EDB. These quality and functional classification designations have been reconciled with License Renewal scoping criteria to provide a means for scoping of License Renewal components and associated systems/structures.

To supplement the PassPort EDB evaluation, the following review process was used to identify additional components within the scope of 10 CFR 54.4(a)(2).

First, the following criteria were applied generically to the 10 CFR 54.4(a)(2) scoping review:

1. In order to be included within the scope of the License Renewal Rule, a system or structure must satisfy at least one of the criteria in 10 CFR 54.4(a)(1) through (a)(3). In some cases, systems and structures will be identified which satisfy more than one of these scoping criteria. CR-3 License Renewal scoping procedures require that all of the SSCs in the scope of the Rule must be identified, but not necessarily associated with all potentially applicable scoping criteria. For example, there is considerable overlap between 10 CFR 54.4(a)(2) and 10 CFR 54.4(a)(3). Site evaluations for FP, ATWS, and SBO inherently rely on non-safety related SSCs in order to demonstrate acceptable results. While components in this category might otherwise fall under Criterion 10 CFR 54.4(a)(2), they may not be specifically identified, because they are already within the scope of License Renewal by virtue of 10 CFR 54.4(a)(3).

2. Various event scenarios in the CLB may assume the failure of some safety related equipment during the course of the event, but still demonstrate the availability of the minimum set of equipment necessary to achieve an acceptable

outcome. It is not required to assure the continued operation of each safety related component for every event. Rather, it is only necessary that safety related functions be maintained for the specific events in which they are required consistent with the CLB.

3. The CR-3 CLB includes instances where non-safety related equipment, augmented with a suitable surveillance or monitoring program, is used to maintain safety related equipment or plant conditions within limits consistent with event assumptions. For instance, plant chemistry is assumed to be within the specifications maintained by the Chemistry Program based upon regular monitoring and analysis. Here, it is the monitoring or surveillance program that is primarily credited with ensuring the appropriate initial conditions exist, rather than the reliability of non-safety related chemistry monitoring equipment. Therefore, the use of non-safety related equipment to establish initial conditions for equipment operation or accident assumptions does not constitute the basis for inclusion in License Renewal scope under 10 CFR 54.4(a)(2).

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

5. The cascading issue applies to 10 CFR 54.4(a)(2) components and involves the consideration of subsequent levels of support systems that are necessary to ensure that a component performs its intended function. The NRC staff position on this issue is as follows:

    > Therefore, to satisfy the scoping criterion under 10 CFR 54.4(a)(2), an applicant needs to identify those non-safety related SSCs (including certain second-, third- or fourth-level support systems) whose failure can prevent the satisfactory accomplishment of the safety related function identified under 10 CFR 54.4(a)(1). In order to identify such systems, an applicant would consider those failures identified in 1) the documentation that makes up its CLB, 2) plant-specific operating experience, and 3) industry-wide operating experience that is specifically applicable to the facility. The applicant need not consider hypothetical failures that are not part of the CLB, and that have not been previously experienced.

    Consistent with this position, cascading was considered to the same level that it has been considered in the CLB. Additionally, consideration was given to plant-specific and applicable industry operating experience to identify non-safety related features that might be required to support the successful completion of a safety related function.

Functional Dependency and Spatial Interaction Review

A methodical review was performed to identify instances where the CLB includes reliance on equipment identified in EDB as non-safety related to support the performance of safety related functions. Elements of this review included:

- Review of the guidance in 10 CFR 54, NUREG-1800, NEI 95-10, and other industry documents that might identify interactions and events that are applicable to 10 CFR 54.4(a)(2);
- Review of CR-3 docketed information;
- Review of other License Renewal applications currently on the docket, as well as discussions with near term applicants;
- Review of interactions and events discussed in the FSAR, including accidents and transients, and in the CR-3 Technical Specifications and Bases;
- Review of the Maintenance Rule Database for system functions meeting the non safety affecting safety related criterion of the Maintenance Rule Program;
- Review of the CR-3 Design Basis Documents for interfaces or interactions between non-safety related and safety related SSCs; and
- Review of plant and industry operating experience, including docketed correspondence, CR-3 Maintenance Rule information, previous License Renewal applications, and operating experience discussions in regulatory and industry License Renewal guidance documents.

In general, there are two ways that an SSC could satisfy the criteria of 10 CFR 54.4(a)(2). The first of these would be where a functional dependency exists between non-safety related and safety related equipment. An example of this would be if a non-safety related pneumatic supply were required to provide motive force for an operator in a safety related system in order for that system to fulfill a safety related function. The other means by which non-safety related equipment might prevent satisfactory accomplishment of an intended function would be through adverse spatial interactions, such as flooding, spraying, or direct physical contact with safety related SSCs. Spatial interactions are further categorized into two types: Direct Physical Interactions and Indirect Physical Interactions. These modes of interaction, i.e., functional, direct physical, and indirect physical, are discussed below.

Functional Dependencies

The CLB information was evaluated to identify functional dependencies between non-safety related and safety related equipment. The review resulted in a number of additional components being brought into scope. Examples of this include:

- The Intake Canal that provides cooling water for plant systems,
- Nuclear Service Water Intake Structure Trash Racks,

- A sluice gate between the two compartments in the Nuclear Service and Decay Heat Seawater System sump pit,
- Thermal insulation such as that credited with reducing piping or equipment heat loads in support of safety related room or area cooling systems, or that limits heat transfer into or out of components in support of Environmental Qualification,
- Components that support equipment credited in the review required by NRC Generic Letter 87-02, "Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors, Unresolved Safety Issue (USI) A-46," February 19, 1987.
- Alternate sources of makeup water and associated flow paths to the Emergency Feedwater System,
- Portions of the Auxiliary Feedwater System, and Systems and components that support use of the Main Condenser for mitigation of a Steam Generator Tube Rupture (SGTR) event as described in FSAR Section 14.2.2.2. There are numerous non-safety related systems and components that support the Main Condenser for this event. Since NEI 95-10 does not provide specific guidance for the situation where a function important to safety could be accomplished by non-essential equipment, this is considered an exception to the guidance of NEI 95-10.

Direct Physical Interactions

Direct physical interactions involve non-safety related components that are connected to and support safety related components or the occurrence of inadvertent direct contact of a falling non-safety related component or structure, such as, the impact of a falling overhead crane or lifting device, onto a safety related component or structure. With regard to direct physical interaction between non-connected piping and safety related SSCs, industry operating experience has shown that mechanisms do not exist which could cause the instantaneous failure of piping systems without prior detectable leakage. For the purposes of License Renewal scoping, it was considered that piping that is adequately supported will not spontaneously fall due to age related failure. Consistent with this philosophy, it is assumed that piping whose functional integrity is routinely affirmed through proper operation and regular observation by plant personnel, will remain supported so long as its supports do not fail. It follows that direct physical interaction of non-safety related piping system components with safety related SSCs is prevented by piping supports, and the "preventive option" consists of managing aging effects of these supports. The approach for managing aging concerns associated with direct physical interactions between non-safety related components and safety related components will include managing supports for non-safety related piping and components (including ducting) in the scope of License Renewal. Unless otherwise specified, these supports will be treated as civil commodities for License Renewal.

Regarding non-safety related piping connected to and providing support for safety related components, NEI 95-10 states that non-safety piping and supports, up to and including the first seismic or equivalent anchor beyond the safety/non-safety interface, are within the scope of License Renewal per 54.4(a)(2). In this context, a seismic anchor is a device or structure that ensures that forces and moments are restrained in three orthogonal directions, and an equivalent anchor is a configuration that is identified in the CLB and considered to provide the equivalent supporting function.

At CR-3, the Piping Analysis Design Basis Document provides the following design requirements regarding non-safety related piping providing seismic support to a non-safety related/safety related interface point:

1. The seismic analysis included all significant Seismic III piping past the valve, although only the Seismic I piping was required to satisfy Seismic I piping stress requirements.

2. One of the following support design philosophies was used for the supports on the Seismic III piping:
    a. All Seismic III supports past the valve were designed as Seismic I supports up to and including the next anchor point in the piping system. An anchor in this context is defined as a full, six-way restraint.
    b. All Seismic III supports past the valve up to and including at least one in each of the three mutually perpendicular directions were designed as Seismic I supports.
    c. If the piping on the Seismic III side of the valve was a long straight run of piping, at least one Seismic III support in each of the two transverse directions to the pipe was designed as a Seismic I support.

Additionally, the Design Basis Document for Piping Supports states that those piping and support systems normally non-safety and Seismic III category whose failure during a prescribed seismic event could jeopardize any other safety related system or component shall be designed to the applicable seismic design criteria and stress limitations of Seismic I design criteria. Examples of support systems which fall into this category are: (1) Those supports that must function to protect a Safety Related/Non-Safety Related pipe class break or a connection to Safety Related equipment, and (2) Those supports that must function to prevent falldown or failure of a Non-Safety Related piping during and after a design basis seismic event.

At CR-3, the following conservative approach is used to ensure that connected non-safety related piping, up to and including the first seismic/equivalent anchor, is included in License Renewal scope.

1. Large bore Seismic Category 1 piping was formally analyzed by computer analysis to satisfy code allowable stresses. Seismic Category 1 small bore piping (2 in. and under) was routed and supported to ensure that the piping met the code allowable stresses. Both large and small bore piping was included in the scope of License Renewal based on a review of stress isometric drawings,

small bore piping construction isometric drawings, and other relevant documentation.

2. Non-safety related piping (including air/gas systems) and ducting components located inside Seismic Class I Structures have been conservatively included in scope unless specific evaluations were performed to justify exclusion. Systems with piping penetrating Seismic Class 1 structures were reviewed to identify instances where seismic boundaries extended outside the structure.

3. Seismic safe shutdown flow paths identified in response to the review of Unresolved Safety Issue (USI) A-46, "Seismic Qualification of Equipment in Operating Plants," have been included in License Renewal scope. This includes not only components identified as “A-46” in EDB but conservative extensions to these boundaries to encompass the functional boundaries associated with these flow paths.

4. Notably, the secondary plant flow loop from the Steam Generators through the Main Steam System turbine bypass valves to the Main Condenser, through the Condensate, Condensate Demineralizer, and Feedwater Systems back to the Steam Generators has been conservatively included in scope of License Renewal for support of mitigation of the Steam Generator Tube Rupture accident. This scoping approach bounds most of the seismic/non-seismic interface locations associated with the Main Steam and Main Feedwater Systems in the Turbine Building.

Based on the extent of the above described review, this approach is considered to have included all connected piping up to and including seismic/equivalent anchors in the scope of License Renewal.

Indirect Physical Interactions

Indirect physical interactions between non-safety related piping and safety related components are associated with degradation of the piping itself, resulting in leaking, spraying, or other potentially detrimental consequences to safety related components. NEI 95-10 provides industry guidance regarding the scoping of non-safety related components for potential adverse spatial interaction. Using the preventive approach described in Appendix F to NEI 95-10, a review was performed to identify non-safety related piping (including Air/Gas systems) and ducting components located within Class I structures and not already in the scope of License Renewal, and to include those components in License Renewal scope under 10 CFR 54.4(a)(2). The methodology used to accomplish this activity is based on EDB equipment type and location information. This review resulted in bringing into scope of License Renewal any non-safety related piping and ducting components located within a Class I structure under the scoping criterion of 10 CFR 54.4(a)(2) unless a specific evaluation was performed that concluded a spatial interaction was not credible.

The CR-3 licensing basis includes a review of potential interactions between CR-3 non-Class 1 and Class 1 structures against the requirements of USI A-46. The review determined that no adverse interactions were possible based on factors such as building design and adequate gaps between structures. The review specifically noted that the Turbine Building was evaluated to assure that there was no impact with adjacent structures under wind or seismic conditions. Also, the evaluation addressed the probability of the Unit 1 & 2 smokestacks impacting Unit 3 safe shutdown equipment and concluded that this was not credible. Consistent with this finding, the Design Basis Document for Major Class III Structures identifies no collision between Class I and non-Class I structures under wind or seismic conditions.

10 CFR 54.4(a)(2) Scoping Summary

The CR-3 scoping methodology for scoping against 10 CFR 54.4(a)(2) makes use of extensive component-level quality data combined with a review of the CLB, operating experience and other pertinent information, to identify SSCs that have potentially adverse spatial interactions with safety related SSCs. Non-safety related systems were also reviewed for potential system interdependencies with safety related systems. The result is a conservative and comprehensive approach consistent with the License Renewal Rule and NRC staff guidance, regarding scoping of 10 CFR 54.4(a)(2).

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

10 CFR 54.4(a)(3) states that SSCs relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for FP (10 CFR 50.48), EQ (10 CFR 50.49), PTS (10 CFR 50.61), ATWS (10 CFR 50.62), and SBO (10 CFR 50.63) are within the scope of License Renewal. Evaluations have been performed to identify and document the SSCs credited for compliance with each of these regulations. For these SSCs, the system/structure level intended function is that it is relied upon in safety analyses or evaluations to demonstrate compliance with NRC requirements for the event in question. Systems or structures that have one or more components credited for demonstrating compliance with one of the regulated events are within the scope of License Renewal per the §54.4(a)(3) criteria.

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

2.1.1.3.1 Fire Protection

The SSCs at CR-3 that support compliance with 10 CFR 50.48 are within the scope of License Renewal. To determine the SSCs required for FP within scope, information in PassPort EDB and other relevant plant documentation was reviewed.

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

1. PassPort EDB data identifying components required to meet FP requirements were reviewed to identify equipment credited for compliance with 10 CFR 50.48.

2. PassPort EDB information was supplemented by a review of the docketed information pertaining to compliance with 10 CFR 50.48, including the FSAR, CR-3 Fire Protection Plan, Fire Hazards Analysis, Topical Design Basis Document for Appendix R, 10 CFR 50 Appendix R Fire Study, the CR-3 Fire Protection SER, and docketed correspondence.

3. Based on the above, License Renewal intended function relative to the criteria of 10 CFR 54.4(a)(3) for FP were identified for each SSC determined to meet this criteria.

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

2.1.1.3.2 Environmental Qualification

10 CFR 50.49(b) defines electric equipment important to safety that is required to be environmentally qualified to mitigate certain accidents that result in harsh environmental conditions in the plant. An EQ Master List (EQML) of equipment has been developed in accordance with the requirements of 10 CFR 50.49. This list is maintained within PassPort EDB, and identifies the equipment within the scope of the CR-3 EQ Program. No further topical reviews were required for License Renewal scoping against Environmental Qualification requirements, and no components were added to License Renewal scope for this regulated event beyond those identified based on PassPort EDB information.

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

1. PassPort EDB identifies components that are on the CR-3 EQML in accordance with 10 CFR 50.49. PassPort EDB was used as an input document for scoping of SSCs. Any system that contained one or more components designated as EQ-related in EDB was considered in scope due to EQ. Also, structures that house the components of the EQML were identified.

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

The scoping process to identify systems and structures relied upon and/or specifically committed to for EQ for CR-3 is consistent with and satisfies the criteria in 10 CFR 54.4(a)(3). Also, the qualified life analysis of EQ components may meet the definition of a TLAA in 10 CFR 54.3. EQ-related TLAAs are discussed in Section 4.4.

2.1.1.3.3 Anticipated Transients Without Scram

CR-3 design features related to mitigating a postulated ATWS event are within the scope of License Renewal because they are relied on to meet the requirements of 10 CFR 50.62. 10 CFR 50.62 required each pressurized water reactor (PWR) to have equipment from the sensor output to final actuation device, that is diverse from the reactor trip system, to automatically initiate the auxiliary (or emergency) feedwater system and initiate a turbine trip under conditions indicative of an ATWS. Additionally, the PWRs manufactured by Combustion Engineering or Babcock & Wilcox (such as CR-3) must have a diverse scram system from the sensor output to interruption of power to the control rods. This scram system must be designed to perform its function in a reliable manner and be independent from the existing reactor trip system.

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

1. PassPort EDB functional requirements data was used to identify equipment required to meet ATWS requirements.

2. A topical review was performed to identify the SSCs credited with mitigating a postulated ATWS event. Systems and components that provide input to ATWS Mitigation System Actuating Circuitry (AMSAC) or respond to an output from AMSAC are part of the commitment to 10 CFR 50.62 and are within the scope of License Renewal. Likewise, the structures that house ATWS components are within the scope of License Renewal.

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

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

2.1.1.3.4 Station Blackout

PassPort EDB quality classifications that have been assigned to components credited with compliance with SBO requirements were used to identify the applicable equipment. To augment PassPort EDB-identified components, additional reviews of the CR-3

Station Blackout Applicability Report and other plant documents and procedures were performed.

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

1. PassPort EDB, FSAR, CR-3 Station Blackout Applicability Report, Design Basis Documents, and plant procedures and NRC guidance regarding additional equipment required to recover from an SBO were reviewed to determine the scope of systems and structures required for SBO.

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

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

For CR-3, including equipment required to recover from an SBO brought into scope various electrical components and associated civil structures associated with providing offsite power via the switchyard to plant electrical buses. Refer to Figure 2.1-1 for a simplified diagram showing these power paths. Structures that support SBO power paths are shown on Figure 2.4-1.

There are two qualified sources of offsite power available when recovering from an SBO event. The first source of offsite power can be obtained through the Offsite Power Transformer (OPT). The OPT is situated in the 230KV Switchyard. The OPT is fed from the 230KV Switchyard, which has multiple sources of supply from the Progress Energy Transmission and Distribution System including other Crystal River power plants. The output of the OPT is connected to the plant through power cables. The power cables from the OPT transition over the West Cable Bridge by way of dedicated conduits, and follow a path along the West Berm where they terminate in the Offsite Power Termination Enclosure. The first isolation devices upstream of the OPT are 230KV plant line breakers 4900 and 4902. These circuit breakers demarcate the 230KV Switchyard from the Progress Energy Transmission and Distribution System and for the purposes of License Renewal represent the scoping boundary for the first qualified source of offsite power.

The second source of offsite power when recovering from an SBO event can be obtained through the Backup Engineered Safeguards Transformer (BEST). The BEST is situated at the north end of the TB next to the Start-Up Transformer. The BEST is fed from the 230KV Switchyard by overhead transmission conductors. The first isolation devices upstream of the BEST are 230KV plant line breakers 1691 and 1692. These circuit breakers demarcate the 230KV Switchyard from the Progress Energy

Transmission and Distribution System and for the purposes of License Renewal represent the scoping boundary for the second qualified source of offsite power.

2.1.1.3.5 Pressurized Thermal Shock

10 CFR 50.61, "Fracture Toughness Requirements for Protection Against Pressurized Thermal Shock Events," requires that licensees evaluate the reactor vessel beltline materials against specific criteria to ensure protection against brittle fracture. CR-3 has documented compliance with 10 CFR 50.61 via several docketed letters provided in response to the issuance of 10 CFR 50.61 and to NRC Generic Letter 92-01, Revision 1, "Reactor Vessel Structural Integrity, 10 CFR 50.54(f)," and Supplement 1, and in letters addressing the impact on Reactor Vessel materials from neutron fluence changes resulting from power uprate. Based upon the current analysis for PTS, CR-3 does not rely on a Regulatory Guide 1.154, "Format and Content of Plant-Specific Pressurized Thermal Shock Safety Analysis Reports for Pressurized Water Reactors," analysis to satisfy the PTS Rule. Since the analysis relies only on Reactor Vessel beltline materials, there are no SSCs, other than the Reactor Vessel, that are within the scope of License Renewal as a result of 10 CFR 50.61. Therefore, the Reactor Vessel is within the scope of License Renewal based on compliance with 10 CFR 50.61.

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

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

2.1.2 STRUCTURE AND COMPONENT SCREENING

This subsection describes the process used at CR-3 to identify the in-scope SCs that require an AMR and justifies the process with respect to requirements of an IPA defined in 10 CFR 54.21(a). In the CR-3 IPA, the process of identifying SCs subject to AMR is referred to as screening.

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

Each application must contain the following information:

(a) An integrated plant assessment (IPA). The IPA must—

(1) For those systems, structures, and components within the scope of this part, as delineated in Sec. 54.4, identify and list those structures and components subject to an aging management review. Structures and

components subject to an aging management review shall encompass those structures and components—

(i) That perform an intended function, as described in Sec. 54.4, without moving parts or without a change in configuration or properties. These structures and components include, but are not limited to, the reactor vessel, the reactor coolant system pressure boundary, steam generators, the pressurizer, piping, pump casings, valve bodies, the core shroud, component supports, pressure retaining boundaries, heat exchangers, ventilation ducts, the containment, the containment liner, electrical and mechanical penetrations, equipment hatches, seismic Category I structures, electrical cables and connections, cable trays, and electrical cabinets, excluding, but not limited to, pumps (except casing), valves (except body), motors, diesel generators, air compressors, snubbers, the control rod drive, ventilation dampers, pressure transmitters, pressure indicators, water level indicators, switchgears, cooling fans, transistors, batteries, breakers, relays, switches, power inverters, circuit boards, battery chargers, and power supplies; and

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

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

During the screening process, some SCs were incorporated into commodity groups based on similarity of their design or materials of construction. Use of commodity groups made it possible to address an entire group of SCs with a single evaluation. This approach is consistent with the changes made in Revision 1 of NUREG-1801, "Generic Aging Lessons Learned (GALL) Report" to enhance its applicability to future plant license renewal applications. One of these revisions was the simplification and generalization of terms used to make the component/commodity line items more generic and less prescriptive. As an example based on the definitions in Section IX of NUREG-1801, Volume 2, the CR-3 definition of "Piping, piping components, and piping elements" replaces various combinations of the following: piping, fittings, tubing, flow elements/indicators, filter/demineralizer housings, nozzles, orifices, flex hoses, expansion joints, pump casing and bowl, safe ends, sight glasses, spray head body, strainer housings, thermowells, valve body and bonnet, and closure bolting.

The screening process included identification of the intended functions of SCs that are subject to AMR. Table 2.1-1 identifies the meanings of the intended functions and defines the abbreviations used on the system and structure screening results tables provided in Sections 2.3, 2.4, and 2.5, and on the aging management review results tables provided in Chapter 3.0.

2.1.2.1 Mechanical Components

The following paragraphs describe the process used to identify mechanical components subject to AMR.

The License Renewal scoping process identified plant SSCs that are within the scope of License Renewal and their system-level intended functions. Each system identified during scoping as being within the scope of License Renewal is screened to identify passive, long-lived mechanical components that support the system intended functions. The system intended functions, together with component information in PassPort EDB, the 10 CFR 54.4(a)(2) scoping evaluation, the 10 CFR 54.4(a)(3) regulated event scoping evaluations, applicable system drawings, and regulatory guidance, were used to identify the passive components requiring AMR. The following guidelines were applied to this effort:

- Passive component determinations are made in accordance with 10 CFR 54.21(a)(1)(i) and the guidance in NEI 95-10.
- Passive components that are not subject to replacement based on a qualified life or specified time period per 10 CFR 54.21(a)(1)(ii) are subject to AMR.
- Housings for active components (e.g., pump casings, valve bodies, fan, blower, and damper housings, etc.) that support the component intended function in a passive manner are subject to AMR.
- Some components, when combined, are considered a complex assembly (e.g., diesel generator starting air skids or heating, ventilating, and air conditioning refrigerant units). Boundaries for such assemblies are established by identifying each structure and component that makes up the complex assembly and determining whether each is subject to AMR.
- Major components within mechanical systems may be screened to a higher level of detail, if deemed appropriate. For example, the major components within the Reactor Coolant System, i.e., the reactor vessel, the reactor vessel internals, the steam generators, reactor coolant pump, and pressurizer, are screened separately from the remainder of the Reactor Coolant System components. Detailed screening is performed to identify subcomponents that perform or support intended functions. Subcomponents generally have the intended function(s) of the parent component, but are not constrained to this. For example, a fire water pump may have the pressure boundary (M-1) intended function, and have an integral strainer that is identified as a subcomponent with the filtration (M-2) intended function.

Considering the guidelines above, the following steps were used to identify mechanical components subject to an AMR. This process utilizes a set of screening steps, or filters, to identify those components meeting the criteria of §54.21(a)(1). Components screened out by at least one filter are not subject to an AMR. These steps/filters can be applied in any order to a given component in the interest of efficiency.

1. Mechanical components were subjected to screening based on active/passive function. Several mechanical components may be categorically excluded by 10 CFR 54.21(a)(1)(i) which provides a summary of specific component types determined to be active. In addition to the component types specifically excluded by the Rule, NEI 95-10, Appendix B, provides a listing of component types sorted by engineering discipline, active/passive determination, and potentially applicable intended functions. Using the Rule and NEI 95-10 as a guide, an evaluation was performed to assign PassPort EDB equipment types to a discipline and to determine whether the equipment has an active or passive role when performing intended functions. Components having equipment types designated as active were not subject to AMR and were categorically screened out on this basis. Components having equipment types that are indeterminate were reviewed individually to ascertain if they are active and thereby excluded from AMR requirements.

2. Mechanical components were reviewed to determine if they constituted a complex assembly. A complex assembly is a predominantly active assembly where the performance of its components is closely linked to that of the intended function of the entire assembly, such that testing/monitoring of the assembly is sufficient to identify degradation of these components. Examples of complex assemblies include diesel generators and refrigeration units. Complex assemblies, per se, are considered active and can be excluded from the 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 considered against the screening criteria.

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

differential pressure instrumentation and an alarm are generally included in this category.

4. Consumable items were evaluated. Consumable parts of a component may be passive, long-lived, and necessary to fulfill an intended function. In accordance with NRC screening guidance in NUREG-1800, Table 2.1-3, consumables may be divided into four basic categories for the purpose of License Renewal: (a) packing, gaskets, component seals, and O-rings; (b) structural sealants; (c) oil, grease, and component filters; and (d) system filters, fire extinguishers, fire hoses, and air packs. NUREG-1800 provides screening guidance for each of these categories. Screening of consumables was done as part of the component AMR or the item was excluded from AMR using the NRC screening guidance.

5. Component intended functions were identified. An evaluation was performed to correlate PassPort EDB equipment types with component intended functions on a generic basis. Components having no generically-established intended function were evaluated separately, and intended functions were assigned on the basis of the role of the component in support of the system intended functions. In this manner, each component subject to AMR was evaluated to determine its component-level mechanical functions performed without moving parts or change in configuration, in fulfilling or supporting system intended functions. Mechanical component intended functions are listed on Table 2.1-1.

2.1.2.2 Civil Structures

The following steps describe the process used to identify civil/structural components and commodities subject to aging management review. The screening process was initiated by performing a "bulk screening" of civil/structural commodity groups. This was followed by an evaluation performed on each structure identified to be within the scope of License Renewal in order to correlate the results of the commodity group screening to the specific components/commodities located in the structure and to assign the proper intended functions to the components/commodities.

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

1. Owing to the large quantity of civil/structural components in the plant, a bulk screening process was employed. Bulk screening involves grouping together typical components and screening them as a single commodity. Implementation of a bulk screening process requires components be grouped by similarity of both construction and function. Civil commodity groups were developed based on a review of PassPort EDB civil classifications along with the civil classifications identified in industry documentation such as Appendix B of NEI 95-10, NUREG-1800, NUREG-1801, and previous License Renewal applications. The "bulk screening" process involved the following:

- The generic list of civil commodity types was reviewed and typical commodity types were compiled into commodity groups based on similarity of function. For example, the EDB types “SWG” – Switchgear, “UTB” – Miscellaneous Terminal Boxes, “PNL” – Panel, “RAC” – Rack, Miscellaneous, were combined under the civil commodity group “Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation.”

- To facilitate alignment of commodities with NUREG-1801, commodity groups were defined to match, to the extent possible, a representative grouping of civil structures or components identified in NUREG-1801.

- Screening of the commodity groups was performed. An active/passive determination was performed on the commodity groups based on whether the commodity supports its intended function without moving parts or without a change in configuration or properties. In addition, a determination of commodity replacement based on a qualified life or specified time period was performed.

- Potential intended functions were identified for each of the passive civil commodities based on guidance from NEI 95-10, NUREG-1800, and industry lessons learned, plant specific License Renewal submittals, the FSAR and PassPort EDB. Potential intended functions are identified on Table 2.1-1. While some civil commodities are identified with multiple intended functions, it is important to note that individual components within the civil commodity group do not necessarily share all of the listed intended functions. During the screening process for each structure, the potential intended functions from "bulk screening" were verified to be applicable to a commodity group in a specific structure.

- Although most civil components were correlated with a generic commodity, some civil components were more appropriately addressed as individual components. Therefore, those civil components which did not correlate with a generic commodity type were identified as unique civil components. Screening in accordance with 10 CFR 54.21(a)(1) and assignment of potential intended functions were also performed on unique civil components.

2. Civil/structural screening was performed for CR-3 structures on a structure basis; commodities located within the specific structure being screened were addressed as part of the structure. The identification of commodities for a specific structure was performed using PassPort EDB location data, design drawings, general arrangement drawings, penetration drawings, plant modifications, the FSAR, Design Basis Documents, system descriptions, and plant walkdowns. The CR-3 License Renewal process was implemented on a discipline basis; for example, mechanical components are addressed within mechanical systems. However,

because civil/structural commodities are associated with all systems, they are addressed as part of the structure in which they are located, whether or not they are part of a mechanical or electrical system. For example, a tagged pipe support for the Emergency Feedwater System is considered a mechanical system component in PassPort EDB; however, it would be screened as a civil commodity within the associated civil structure.

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

- Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation - MCCs are electrical enclosures; therefore, the civil commodity "Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation is added to the structure.
- Anchorage Embedment – Because the MCC must be anchored to the structure, the commodity "Anchorage Embedment" is included within the structure.
- Cable Tray, Conduit, HVAC Ducts, Tube Track – Because electrical components such as the MCC require cables to be routed to them, and cables are routed in trays and conduits, this civil commodity is added to the structure.

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

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

2.1.2.3 Electrical and I&C Systems

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

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

Step 1 of the electrical screening process was to identify the various electrical component types from the systems and structures determined to be in scope for License Renewal. PassPort EDB electrical component types from in-scope systems and structures were included in this evaluation. The EDB review took advantage of the previously-completed screening activities for EDB components that segregated component types by discipline.

Step 2 of the process was to identify non-tagged electrical component types (i.e., those not resident in PassPort EDB) from in-scope systems and structures. The EPRI License Renewal Electrical Handbook was the primary tool utilized for this portion of the process. The Handbook represents a compilation of lessons learned from previous License Renewal applicants and incorporates guidance from various industry and regulatory documents such as NEI 95-10, NUREG-1800, and NUREG-1801. CR-3 documentation such as electrical diagrams, process and instrumentation drawings, vendor technical manuals, and plant modification packages were also reviewed during this portion of the process.

Step 3 of the process involved organizing the comprehensive list of electrical component types that was developed in Steps 1 and 2 into commodity groups. This commodity-based approach, whereby component types with similar design and functional characteristics are grouped together, is consistent with guidance from Appendix B of NEI 95-10 and Table 2.1-5 of NUREG-1800.

Step 4 of the electrical screening process was the application of the passive screening criteria of 10 CFR 54.21(a)(1)(i) to the electrical and I&C commodity groups. This effort took advantage of the previously-completed bulk screening of PassPort EDB components based on component type. In addition, guidance from the EPRI License Renewal Electrical Handbook was used to identify the electrical commodity groups considered to have a passive function. Commodity groups that have passive functions may be subject to an AMR and were identified by this step.

Step 5 of the electrical screening process was to apply the long-lived screening criteria of 10 CFR 54.21(a)(1)(ii) to the passive commodity groups identified in Step 4. Component commodity groups that are not subject to replacement based on a qualified life or specified time period, i.e., the screening criterion of 10 CFR 54.21(a)(1)(ii), were identified as requiring an AMR. Commodity group components that are replaced based on qualified life or specified time period (i.e., short-lived components) are not subject to AMR.

Step 6 was the final step of the electrical screening process and involved the identification of the intended functions of the electrical commodity groups subject to AMR. The identification of electrical commodity group intended functions took advantage of the previous-completed component database screening activities that identified intended functions based on equipment type.

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

2.1.3 GENERIC SAFETY ISSUES

In accordance with the guidance in NEI 95-10 and Appendix A.3 of NUREG-1800, review of NRC Generic Safety Issues (GSIs) as part of the license renewal process is required to satisfy a finding per 10 CFR 54.29. GSIs that involve issues related to License Renewal aging management reviews or time-limited aging analyses are to be addressed in the LRA. As a result of the review of NUREG-0933, "A Prioritization of Generic Safety Issues," Supplement 31, dated September 2007, the following GSI evaluations are provided:

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

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

addressed within the period of extended operation by the Steam Generator Tube Integrity Program discussed in Section B.2.

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

4. GSI-190, Fatigue Evaluation of Metal Components for 60-year Plant Life - This GSI addresses fatigue life of metal components and was closed by the NRC. However, the NRC concluded that license renewal applicants should address the effects of reactor coolant environment on component fatigue life. Accordingly, the issue of environmental effects on component fatigue life is addressed in Section 4.3.

5. GSI-191, Assessment of Debris Accumulation on PWR Sump Performance - This GSI addresses the potential for blockage of containment sump strainers that filter debris from cooling water supplied to the safety injection and containment spray pumps following a postulated LOCA. The issue is based on the identification of new potential sources of debris, including failed containment coatings that may block the sump strainers. Degradation of coatings inside containment is an issue under the CLB and is being addressed in accordance with NRC Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors." The issue of coating degradation has been evaluated and determined not to involve a TLAA. Also, CR-3 does not credit coatings to assure that the intended functions of coated SCs are maintained; thus this is not specifically a License Renewal concern.

2.1.4 INTERIM STAFF GUIDANCE ISSUES

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

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

   This LR-ISG is under development pending preparation of an augmented inspection program by the industry (i.e., NEI and EPRI). Guidance will be promulgated by the NRC following its review of the proposed industry program. The CR-3 Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel

Closure Heads of Pressurized Water Reactors Program is addressed in Section B.2. In addition, a commitment to implement the activities specified in NUREG-1801 with regard to this issue is documented in Subsection A.1.1.

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

   The NRC staff has issued final guidance for this issue. However, the CR-3 containment is a large, dry containment and is not a Mark I Boiling Water Reactor containment. Therefore, this LR-ISG is not applicable to CR-3.

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

   The NRC staff has promulgated for public comment proposed guidance for this issue. The guidance of this LR-ISG consists of an environmental report (ER) acceptance review checklist for use by the NRC staff. The information provided in the Applicant's Environmental Report - Operating License Renewal Stage for CR-3 is based on the experience gained in the preparation and NRC review of previous LR Applications for Progress Energy nuclear plants. Refer to Table 1-1 of the CR-3 ER for a tabulation of where the requirements of 10 CFR 51.53(c), "Post-construction Environmental Reports," are addressed in the CR-3 ER.

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

   The NRC staff has issued final guidance for this issue. The format and content of the SAMA evaluation for CR-3 is based on the experience gained in the preparation and NRC review of previous LR Applications for Progress Energy nuclear plants. The format and content of SAMA analyses for previous Progress Energy LRAs have been found to be acceptable.

5. **LR-ISG-2007-01, Updating the LR-ISG Process to Include References to the Environmental Review Guidance Documents, References for the Recent Publication of Revision 1 of the License Renewal Guidance Documents, and Minor Revisions to Be Consistent with Current Staff Practices**

   The NRC staff is developing this ISG. No guidance has yet been promulgated.

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

   The NRC staff has promulgated for public comment proposed guidance for this issue. The guidance of this LR-ISG has been incorporated into the aging management program applicable to Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements in Section B.2.

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

   The NRC staff has promulgated for public comment proposed further guidance regarding scoping of switchyard components for this issue. This guidance has been considered in the preparation of Subsection 2.1.1.3.4.

2.1.5 CONCLUSIONS

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

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

TABLE 2.1-1 INTENDED FUNCTION ABBREVIATIONS AND DEFINITIONS

Abbrev.	Intended Function	Definition
Civil/Structural Intended Functions		
C-1	Structural Pressure Boundary	Provide pressure boundary or essentially leaktight barrier to protect public health and safety in the event of any postulated design-basis events.
C-2	Structural Support for Criterion (a)(1) components	Provide structural support and/or functional support to safety related components.
C-3	Shelter, Protection	Provide shelter/protection to safety related components.
C-4	Fire Barrier	Provide rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant.
C-5	Shutdown Cooling Water	Provide source of cooling water for plant shutdown.
C-6	Missile Barrier	Provide missile barrier (internally or externally generated).
C-7	Structural Support for Criterion (a)(2) and (a)(3) components	Provide structural support and/or functional support to non-safety related components.
C-8	Flood Barrier	Provide flood protection barrier (internal and external flooding event).
C-9	Gaseous Release Path	Provide path for release of filtered and unfiltered gaseous discharge.
C-10	Absorb Neutrons	Absorb neutrons.
C-11	Pipe Whip Restraint/HELB Shielding	Provide pipe whip restraint/Provide shielding against high-energy line breaks.
C-12	Heat Sink	Provide heat sink during station blackout or design-basis accidents.
C-13	Direct Flow	Provide spray shield or curbs for directing flow (e.g., safety injection flow to containment sump).
C-14	Shielding	Provide shielding against radiation.
C-15	Expansion/Separation	Provide for thermal expansion and/or seismic separation.
Electrical Intended Functions		
E-1	Electrical Continuity	Provide electrical connections to specified sections of an electrical circuit to deliver voltage, current or signals.
E-2	Electrical Insulation	Insulate and support an electrical conductor.
Mechanical Intended Functions		
M-1	Pressure Boundary	Provide pressure-retaining boundary (so that sufficient flow at adequate pressure is delivered or undesirable spatial interactions are prevented).
M-2	Filtration	Provide filtration.
M-3	Throttle	Provide flow restriction/throttle.
M-4	Structural Support	Provide structural support/seismic integrity. (Note 1)
M-5	Heat Transfer	Provide heat transfer.
M-6	Thermal Insulation	Provide insulation/thermal resistance.
M-7	Fission Product Holdup	Provide post-accident containment, holdup, and plateout of source term during Steam Generator Tube Rupture. (Note 2)
M-8	Spray Pattern	Provide adequate flow in a properly distributed spray pattern.
M-9	Core Support	Provide structural support to maintain reactor core configuration and flow distribution.

TABLE 2.1-1 (continued) INTENDED FUNCTION ABBREVIATIONS AND DEFINITIONS

Abbrev.	Intended Function	Definition
Mechanical Intended Functions (continued)		
M-10	Reactor Vessel Internals Support	Provide structural support for the reactor vessel internals and core.
M-11	Reactor Vessel Shielding	Provide gamma and neutron shielding.

Notes:

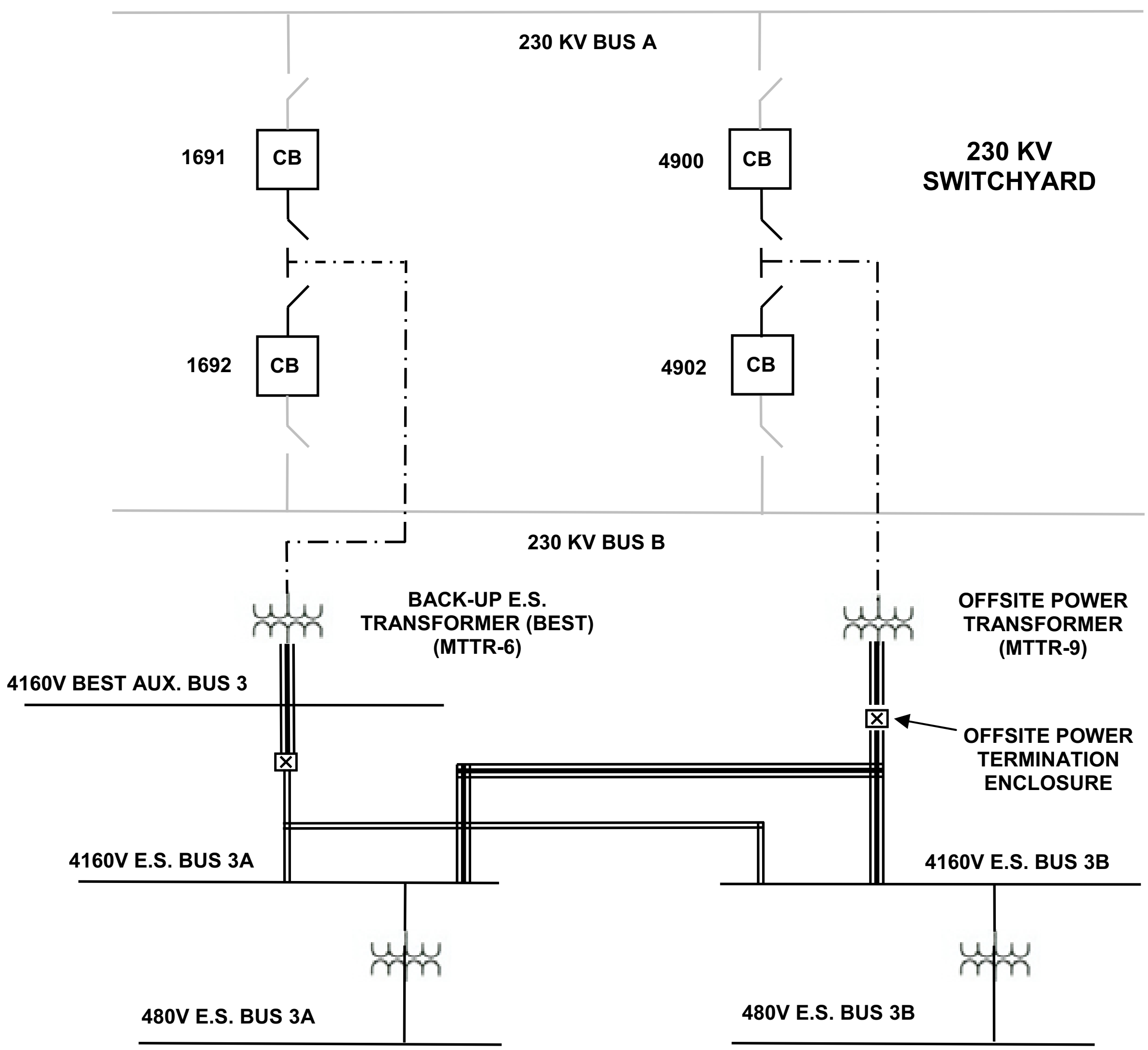
1. In a limited number of cases, there may be piping segments past credited isolation points that are relied upon only to provide seismic support. Considering that the integrity requirements for the pressure boundary function can be presumed to exceed those associated with structural integrity, and that there would be no impact on aging management requirements, these components have been conservatively assigned the pressure boundary (M-1) intended function. The Seismic/ Structural support function (M-4) has not typically been used in association with piping/ducting components.
2. This function was not used.

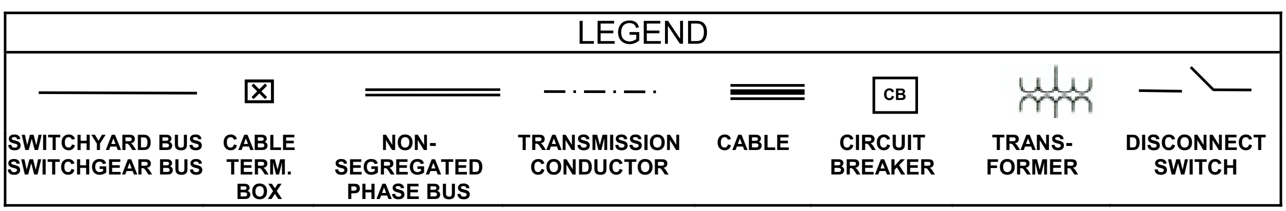
FIGURE 2.1-1 POWER PATHS USED FOR STATION BLACKOUT RECOVERY

NOTES:

THIS SIMPLIFIED DRAWING SHOWS RESTORATION POWER PATHS USED FOR RECOVERING OFFSITE POWER FOLLOWING AN SBO EVENT. ADDITIONAL DETAIL CAN BE SEEN ON FSAR FIGURE 8-1 AND FSAR FIGURE 8-2

230 KV SWITCHYARD BUSSES A & B ARE NOT PART OF THE SBO OFFSITE RECOVERY POWER PATH BUT ARE SHOWN FOR TECHNICAL CLARIFICATION.





2.2 PLANT LEVEL SCOPING RESULTS

The CR-3 License Renewal review methodology consists of three processes: scoping, screening, and aging management reviews. This section provides the results of application of the scoping process described in Subsection 2.1.1.

Tables 2.2-1, 2.2-2, and 2.2-3 provide the results of applying the License Renewal scoping criteria to mechanical systems, structures, and electrical/I&C systems. Also, included in the tables are references to the sections in the application that discuss screening results for in-scope systems and structures.

Figure 2.2-1 provides a layout view of CR-3 and identifies the major in-scope plant structures.

TABLE 2.2-1 LICENSE RENEWAL SCOPING RESULTS FOR MECHANICAL SYSTEMS

System Name	System in License Renewal Scope	Screening Results Application Subsection
Analysis Software	No	-
Air Handling Ventilation and Cooling System	Yes	2.3.3.1
Reactor Building Recirculation System	Yes	2.3.3.2
Reactor Building Miscellaneous Ventilation	Yes	2.3.3.3
Reactor Building Purge System	Yes	2.3.3.4
Auxiliary Building Supply System	Yes	2.3.3.5
Fuel Handling Area Supply System	Yes	2.3.3.6
Decay Heat Closed Cycle Pump Cooling System	Yes	2.3.3.7
Spent Fuel Coolant Pump Cooling System	Yes	2.3.3.8
Spent Fuel Pit Supply System	Yes	2.3.3.9
Auxiliary Building Exhaust System	Yes	2.3.3.10
Control Complex Ventilation System	Yes	2.3.3.11
Emergency Diesel Generator Air Handling System	Yes	2.3.3.12
Miscellaneous Area HVAC System	Yes	2.3.3.13
Turbine Building Ventilation System	Yes	2.3.3.14
Penetration Cooling System	Yes	2.3.3.15
Office Building HVAC System	No	-
Technical Support Center Air Handling System	No	-
EFIC Room HVAC System	Yes	2.3.3.16
Appendix R Control Complex Dedicated Cooling Supply System	Yes	2.3.3.17
Emergency Feedwater Pump Building Ventilation System	Yes	2.3.3.18
Condenser Air Removal System	Yes	2.3.4.1
Auxiliary Steam System	Yes	2.3.4.2
Reactor Building Spray System	Yes	2.3.2.1
Reactor Building Pressure Sensing and Testing	No	-
Chemical Addition System	Yes	2.3.3.19
Liquid Sampling System	Yes	2.3.3.20
Post Accident Liquid Sampling System	Yes	2.3.3.21
Condensate Chemical Treatment System	Yes	2.3.4.3
Condensate System	Yes	2.3.4.4
Core Flood System	Yes	2.3.2.2
OTSG Chemical Cleaning System	Yes	2.3.4.5
Control Complex Chilled Water System	Yes	2.3.3.22
Appendix R Chilled Water System	Yes	2.3.3.23
Industrial Cooling	Yes	2.3.3.24
Carbon Dioxide System	No (Note 1)	-
CD & FW Chemical Cleaning System	Yes	2.3.4.6

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

System Name	System in License Renewal Scope	Screening Results Application Subsection
Circulating Water System	Yes	2.3.3.25
Condenser Tube Cleaning System	No	-
Screen Wash Water System	No	-
Condensate Demineralizer System	Yes	2.3.4.7
EFP-3 Diesel Air Starting System	Yes	2.3.3.26
Decay Heat Closed Cycle Cooling System	Yes	2.3.3.27
Fuel Oil System	Yes	2.3.3.28
Decay Heat Removal System	Yes	2.3.2.3
Jacket Coolant System	Yes	2.3.3.29
Diesel Generator Lube Oil System	Yes	2.3.3.30
Domestic Water System	Yes	2.3.3.31
Control Rod Drive Control System	Yes	2.3.1.2
Demineralized Water System	Yes	2.3.3.32
Emergency Feedwater System	Yes	2.3.4.8
Emergency Diesel Generator System	Yes	2.3.3.33
Electro-Hydraulic Control System	Yes	2.3.4.9
Engineered Safeguards System	Yes	2.3.2.4
Extraction Steam System	No	-
Floor Drains System	Yes	2.3.3.34
Fuel Handling System	Yes	2.3.3.35
Fire Protection System	Yes	2.3.3.36
Main Feedwater System	Yes	2.3.4.10
Cathodic Protection System	No	-
Generator Gas System	No	-
Gland Steam System	Yes	2.3.4.11
Gland Seal Water System	Yes	2.3.4.12
Hypochlorinator System	No	-
Heater Drains System	Yes	2.3.4.13
Heater Vents System	Yes	2.3.4.14
Hydrogen Supply System	Yes	2.3.3.37
Instrument Air System	Yes	2.3.3.38
Incore Monitoring System	Yes	2.3.1.3
Laundry System	No	-
Lube Oil System	No	-
Main Feedwater Turbine Lube Oil System	Yes	2.3.4.15
Reactor Coolant Pump Lube Oil Collection System	Yes	2.3.3.39
Turbine Lube Oil System	No	-

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

System Name	System in License Renewal Scope	Screening Results Application Subsection
Leak Rate Test System	Yes	2.3.3.40
Machine Shop	No	-
Miscellaneous Drains System	Yes	2.3.3.41
Main Steam System	Yes	2.3.4.16
Make Up & Purification System	Yes	2.3.3.42
Miscellaneous Vents System	No	-
Miscellaneous Mechanical & Structures System	Yes	2.3.3.43
Nitrogen Supply System	Yes	2.3.3.44
Penetration Cooling Auxiliary System	Yes	2.3.3.45
Reactor Building Airlock System	Yes	2.3.3.46
Reactor Coolant System	Yes	2.3.1.1
Roof Drains System	Yes	2.3.3.47
Reheat Steam System	No	-
Radiation Monitoring System	Yes	2.3.3.48
Relief Valve Vent System	Yes	2.3.4.17
Nuclear Service and Decay Heat Sea Water System	Yes	2.3.3.49
Station Air System	Yes	2.3.3.50
Secondary Services Closed Cycle Cooling Water System	Yes	2.3.3.51
Station Drains System	Yes	2.3.3.52
Sanitary Sewage System	No	-
Spent Fuel Cooling System	Yes	2.3.3.53
Lube Oil Detraining Tank Vent System	No	-
Secondary Plant	Yes	2.3.4.18
Secondary Cycle Sampling System	No	-
Cycle Startup System	Yes	2.3.4.19
Nuclear Services Closed Cycle Cooling System	Yes	2.3.3.54
Turbine Generator	Yes	2.3.4.20
Turbine Drains System	No	-
Turbine Generator Seal Oil System	No	-
Cable Tray	No (Note 2)	-
Waste Disposal System	Yes	2.3.3.55
Radwaste Demineralizer System	No	-
Radioactive Gas Waste Disposal System	Yes	2.3.3.56
Radioactive Liquid Waste Disposal System	Yes	2.3.3.57
Reactor Coolant and Miscellaneous Waste Evaporator System	Yes	2.3.3.58
Waste Gas Sampling System	Yes	2.3.3.59
Waste Sampling System	Yes	2.3.3.60

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

System Name	System in License Renewal Scope	Screening Results Application Subsection
Post Accident Containment Atmospheric Sampling System	Yes	2.3.3.61
Cycle Makeup and Water Treatment System	No	-
Dry Spent Fuel Storage	No	-
Generic Environmental Qualification	No	-

Notes:

1. The Carbon Dioxide System does not perform or support any safety related functions or any of the functions identified in 10 CFR 54.4(a). The fire protection functions of the system are based on commercial risk which does not meet the criteria of 10 CFR 54.4(a)(3).
2. Cable trays have been categorized as civil commodities and are addressed as part of the structure in which they are located.

TABLE 2.2-2 LICENSE RENEWAL SCOPING RESULTS FOR STRUCTURES

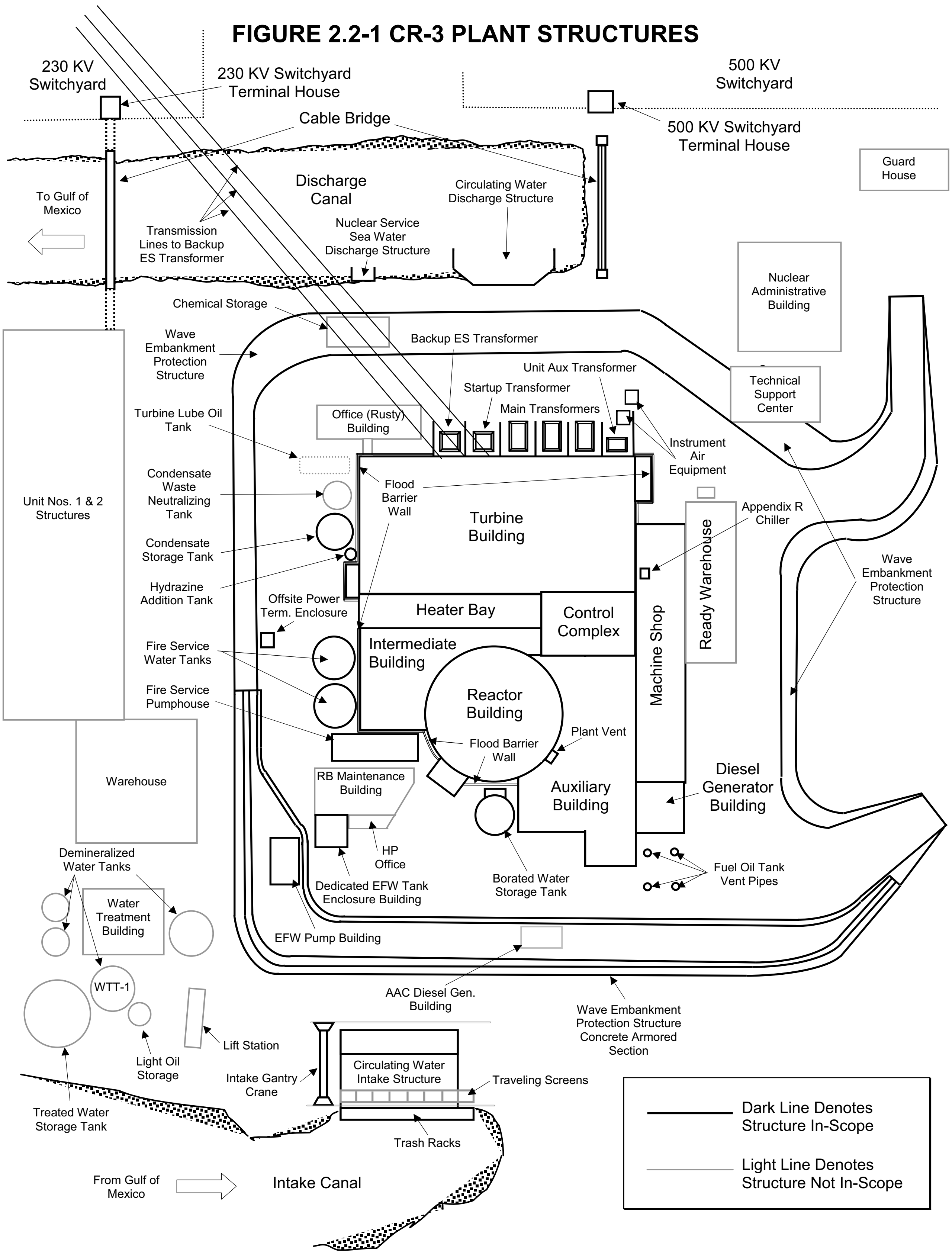
Structure Name	Structure in License Renewal Scope	Screening Results Application Subsection
Auxiliary Building	Yes	2.4.2.1
Ready Warehouse	No	-
Wave Embankment Protection Structure	Yes	2.4.2.2
Borated Water Storage Tank Foundation and Shield Wall	Yes	2.4.2.3
Central Alarm Station	No	-
Cable Bridge	Yes	2.4.2.4
Control Complex	Yes	2.4.2.5
Intake and Discharge Canals	Yes	2.4.2.6
Chemical Storage Building	No	-
CR3 Chemical Warehouse	No	-
Circulating Water Discharge Structure (includes the Nuclear Services Sea Water Discharge Structure)	Yes	2.4.2.7
Circulating Water Intake Structure	Yes	2.4.2.8
Diesel Generator Building	Yes	2.4.2.9
Alternate AC Diesel Generator Building	No	-
EFW Pump Building	Yes	2.4.2.10
Dedicated EFW Tank Enclosure Building	Yes	2.4.2.11
Fire Service Pumphouse	Yes	2.4.2.12
Intermediate Building	Yes	2.4.2.13
Machine Shop	Yes	2.4.2.14
Miscellaneous Structures (Note 1)	Yes	2.4.2.15
Nuclear Administrative Building	No	-
Nuclear Security Operations Center	No	-
Office Building (Rusty Building)	No	-
Plant Administrative Building	No	-
Reactor Building	Yes	2.4.1
Reactor Building Maintenance Support Building	No	-
Switchyard for Crystal River Site	Yes	2.4.2.16
Switchyard Relay Building	Yes	2.4.2.17
Turbine Building	Yes	2.4.2.18
Technical Support Center	No	-

Note 1: The following Miscellaneous Structures were evaluated and found not to be in scope because they perform no License Renewal intended functions and do not pose a seismic interaction risk for any Class I structures: a) Condensate Waste Neutralizing Tank Foundation, b) Domestic Water Tank Foundation, c) Security Towers, d) Nitrogen Tanks and Vaporizer Foundation, e) Turbine Lube Oil Tank, f) Monorails Behind the Fire Water Tanks, g) Evaporative Cooling Tower Supports, h) Fire Brigade Storage Shed, i) Concrete Trench between the Office Building (Rusty Building) and the Chemical Storage Building, j) Warehouses and Shops Outside the Protected Area, k) Foundations for the Demineralized Water Tanks, l) Water Treatment Building, and m) Crystal River Site Fossil Units.

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

System Name	System in License Renewal Scope	Screening Results Application Subsection
Distributed I&C System Platform	No	-
PNET - Process Network	No	-
Miscellaneous AC Distribution System	Yes	2.5
Annunciator System	Yes	2.5
Anticipated Transients Without Scram System	Yes	2.5
Main Control Board	Yes	2.5
Plant Communication System	Yes	2.5
Plant Process Computer System	Yes	2.5
Commercial Telephones	No	-
250/125 Volt DC System	Yes	2.5
EFIC System	Yes	2.5
Emergency Dose Assessment System	No	-
Emergency Monitoring System	Yes	2.5
Sequence of Events Recorder	Yes	2.5
Heat Tracing System	Yes	2.5
Integrated Control System	Yes	2.5
Lighting System	No	-
Loose Parts Monitoring System	No	-
Miscellaneous Electrical System	Yes	2.5
Miscellaneous Instrumentation System	No	-
Meteorological Measurements System	Yes	2.5
Auxiliary Electrical Power System	Yes	2.5
Nuclear Instrumentation System	Yes	2.5
Non-Nuclear Instrumentation System	Yes	2.5
OSI PI Computer System	No	-
Plant Control System	No	-
Penetrations System	Yes	2.5
Reactimeter Patch Panel	No	-
Plant Security System	No	-
Reactor Protection System	Yes	2.5
Remote Shutdown System	Yes	2.5
Substation	Yes	2.5
Seismic Monitoring Instrumentation	No	-
120 VAC Vital Distribution	Yes	2.5
Containment Hydrogen Monitoring System	Yes	2.5

FIGURE 2.2-1 CR-3 PLANT STRUCTURES



2.3 SCOPING AND SCREENING RESULTS – MECHANICAL SYSTEMS

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

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

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

The screening results are provided below in four subsections that are based on the major mechanical sections addressed in NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," Rev. 1, U.S. Nuclear Regulatory Commission, September 2005, (the GALL Report):

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

2.3.1 REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

The following CR-3 systems are included in the NUREG-1801 category of Reactor Vessel, Internals, and Reactor Coolant System:

1. Reactor Coolant System (Subsection 2.3.1.1)

2. Control Rod Drive Control System (Subsection 2.3.1.2)

3. Incore Monitoring System (Subsection 2.3.1.3)

2.3.1.1 Reactor Coolant System

System Description

During normal operation the Reactor Coolant System (RCS) transfers heat from the reactor core to the steam generators where steam is produced to drive the main generator. Additionally, the RCS provides the following functions related to nuclear safety:

1. Circulates reactor coolant and transfers sufficient heat from the reactor core to the secondary fluid in the steam generators during anticipated operational occurrences, so that fuel thermal limits are not exceeded with flow supplied by either the Reactor Coolant Pumps or by natural circulation,
2. Forms a barrier against the release of reactor coolant and radioactive material to the Reactor Building or the Main Steam System (i.e., forms part of the Reactor Coolant Pressure Boundary),
3. Serves as a neutron moderator and reflector and as a solvent for soluble neutron poison used in chemical shim reactivity control, and
4. Allows for high pressure injection core cooling through the power operated relief valve (PORV) in the event the heat transfer capability in the steam generators is lost.

The RCS consists of a Reactor Vessel, two Once-Through Steam Generators (OTSGs), an electrically heated Pressurizer, four Reactor Coolant Pumps (RCPs), three pressurizer relief valves, and the control/isolation valves and interconnecting piping required for system operation. The system is arranged in two parallel heat transport loops. Each RCS loop contains a OTSG for heat removal and two RCPs that provide the driving head for system flow. Reactor coolant pressure is controlled by the Pressurizer, which is designed to maintain system pressure and primary coolant inventory during steady state operation and transient conditions. The system piping configuration and component elevations are designed to facilitate natural circulation cooling when RCS temperature is above 212ºF.

Reactor coolant enters the Reactor Vessel through four 28 in. inlet nozzles. The core internals components direct the coolant downward between the vessel wall and the thermal shield/core barrel toward the bottom of the vessel. After mixing in the area between the bottom head and the flow distributor, the coolant is directed upward through the core to the upper plenum. From the plenum, the coolant exits the vessel through two outlet nozzles to the 36 in. hot legs.

A surge line on the "A" hot leg connects the RCS to the Pressurizer. The suction line to the Decay Heat Removal System is connected to the "B" hot leg. The return from the Decay Heat Removal System enters the Reactor Vessel through the two core flood injection lines. The loop hot leg piping directs the coolant to the top of a steam generator. In each OTSG, coolant flows downward through tubes, transferring heat to the secondary fluid on the shell side of the steam generator. The coolant exits the bottom of each OTSG through two outlet nozzles and flows to the suctions of the two RCPs in the loop. From the discharges of the RCPs, the coolant is returned to Reactor Vessel inlet nozzles. A letdown line on the suction line to reactor coolant pump RCP-1D connects the RCS to the Make Up & Purification System. A portion of the reactor coolant is continuously letdown to the Make Up & Purification System to ensure water quality. A connection at the discharge of the reactor coolant pump RCP-1B provides spray flow to the Pressurizer. High pressure injection flow from the Make Up & Purification System to the RCS is provided by injection lines connected to the discharge piping of each RCP. Return flow to the RCS from the Make Up & Purification System is normally automatically adjusted, as required, to maintain the Pressurizer level.

Reactor Vessel and Internals

The Reactor Vessel consists of a cylindrical shell, a cylindrical support skirt, a spherically dished bottom head, and a ring flange to which a removable reactor closure head is bolted. The reactor closure head is a one-piece forged spherically dished head and a matching ring flange. The reactor closure head flange and the reactor vessel flange are joined by studs. Two metallic O-rings seal the Reactor Vessel when the reactor closure head is bolted in place. Leak-off taps are provided in the annulus between the two O-rings to dispose of leakage. During Refuel 13, the original Reactor Vessel Closure Head (RVCH) was replaced. The replacement RVCH is constructed from a one-piece forging, thereby eliminating the circumferential butt weld and the formed plate dome. Additionally, the replacement RVCH contains Control Rod Drive Mechanism (CRDM) nozzles made from Alloy 690, versus the original RVCH which contained CRDM nozzles made of Alloy 600. Alloy 690 was selected because of its superior resistance to Primary Water Stress Corrosion Cracking (PWSCC).

The Reactor Vessel Internals include the Core Support Assembly, Upper Plenum Assembly, Fuel Assemblies, Control Rod Assemblies, Axial Power Shaping Rod Assemblies, surveillance specimens and holder tubes, and incore instrumentation. Guide lugs, welded to the inside of the Reactor Vessel wall, limit the reactor internals and core to a vertical drop of one-half inch or less and prevent rotation of the reactor core and internals about the vertical axis in the unlikely event of a major core barrel or core support shield failure. The reactor internals are designed to direct the reactor coolant flow, support the reactor core, and guide the control rods throughout their full stroke. The reactor internals and core are supported from the Reactor Vessel flange. The CRDMs are supported by the nozzles in the RVCH. Surveillance specimens, made from appropriately selected specimens of Reactor Vessel steel, are located between the Reactor Vessel wall and the thermal shield. These specimens are located to afford the desired fast neutron exposure lead time with respect to the Reactor Vessel wall, and will be examined at appropriate intervals to evaluate Reactor Vessel material nil ductility transition temperature changes.

Once-Through Steam Generators

Two OTSGs supply superheated steam while providing a barrier to prevent fission products and activated corrosion products from entering the steam system. The OTSGs are vertical, straight tube, tube and shell heat exchangers that produce superheated steam at constant pressure over the power range. Reactor coolant flows downward through the tubes and transfers heat to generate steam on the shell side. The high pressure (i.e., RCS pressure) parts of the steam generators are the hemispherical heads, the tube sheets, and the tubes between the tube sheets. Tube support plates maintain the tubes in a uniform pattern along their length. Each OTSG is supported by a skirt attached to the bottom head. The shell, outside of the tubes, and tube sheets form the boundary of the steam producing section of the OTSG. Within the shell, the tube bundle is surrounded by a cylindrical baffle. Openings in the baffle, at the feedwater inlet nozzle elevation, provide a path for steam to afford contact feedwater heating. The upper part of the annulus formed by the baffle plate and the shell is the superheat steam outlet zone, while the lower part forms the feedwater inlet heating zone. Vent, drain, instrumentation nozzles, and inspection handholes are provided on the shell side of the steam generators. The reactor coolant side has manway openings in both the top and bottom heads, and a drain nozzle on the bottom head. Venting of the reactor coolant side of each OTSG is accomplished by a vent connection on the reactor coolant inlet pipe. Emergency feedwater is supplied through an emergency feedwater ring located at the top of each OTSG. This arrangement assures natural circulation of the reactor coolant following the unlikely event of the loss of all RCPs.

Pressurizer

The Pressurizer is a vertical cylindrical vessel with a bottom surge line penetration connected to the RCS piping at the reactor outlet. The Pressurizer contains removable electric heaters in its lower section and a water spray nozzle in its upper section to maintain RCS pressure within desired limits. The Pressurizer vessel is protected from thermal effects by a thermal sleeve in the surge line nozzle and spray line nozzle, and by an internal diffuser located above the surge line entrance to the Pressurizer.

Reactor Coolant Pumps

The RCPs are single stage, single suction, constant speed, vertical centrifugal pumps. Each RCP employs a shaft sealing system consisting of three mechanical seal assemblies arranged in a removable cartridge and a top vapor barrier standpipe to prevent reactor coolant leakage to the atmosphere. The RCP casing consists of a bottom suction inlet passage which delivers the reactor coolant to the main impeller, a multi-vaned diffuser, and a collecting scroll which directs the reactor coolant out through a horizontal discharge nozzle. A water-lubricated, self-aligning radial hydrostatic bearing is located in the RCP casing just above the main impeller. The RCP casing is welded into the RCS piping. The RCP internals can be removed for inspection or maintenance without removing the RCP casing from the RC system piping. Each RCP has a separate, single speed, top-mounted electric drive motor connected to the pump by a removable shaft coupling. Each RCP stuffing box contains a thermal barrier, recirculation impeller, shaft seal heat exchanger, removable mechanical seal cartridge, and a top vapor barrier standpipe.

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

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

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

3. Components that are relied on during postulated fires, anticipated transients without scram, station blackout, and pressurized thermal shock events, and

4. Components that are part of the EQ Program.

FSAR and Drawing References

The RCS is discussed further in FSAR Chapter 4.0 and Sections 5.1 and 7.4.8.

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

302-651-LR, Sheet 1 302-651-LR, Sheet 2

Components Subject to Aging Management Review

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

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

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Reactor Vessel; Closure Head Dome	M-1 Pressure Boundary
Reactor Vessel; Closure Head Lifting Lugs	M-4 Structural Support

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

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Reactor Vessel; Closure Head Flange	M-1 Pressure Boundary
Reactor Vessel; Closure Head Stud Assembly	M-1 Pressure Boundary
Reactor Vessel; Vessel Flange Leak Detection Line	M-1 Pressure Boundary
Reactor Vessel; Vessel Flange Leak Detection Line Tap Weld	M-1 Pressure Boundary
Reactor Vessel; CRDM Nozzle Body	M-1 Pressure Boundary
Reactor Vessel; CRDM Nozzle Adapter Flange	M-1 Pressure Boundary
Reactor Vessel; CRDM Nozzle Body to Nozzle Adapter Flange Weld	M-1 Pressure Boundary
Reactor Vessel; CRDM Head Penetration Flange Bolting	M-1 Pressure Boundary
Reactor Vessel; Inlet and Outlet Nozzles	M-1 Pressure Boundary
Reactor Vessel; Core Flood Nozzles	M-1 Pressure Boundary
Reactor Vessel; Core Flood Nozzle Flow Restrictors	M-3 Throttle
Reactor Vessel; Core Flood Nozzle Safe Ends	M-1 Pressure Boundary
Reactor Vessel; Core Flood Nozzle Weld	M-1 Pressure Boundary
Reactor Vessel; Upper Nozzle Belt Forging	M-1 Pressure Boundary
Reactor Vessel; Lower Nozzle Belt Forging	M-1 Pressure Boundary
Reactor Vessel; Upper Shell Plate	M-1 Pressure Boundary
Reactor Vessel; Lower Shell Plate	M-1 Pressure Boundary
Reactor Vessel; Beltline Welds	M-1 Pressure Boundary
Reactor Vessel; Upper Shell Flange	M-1 Pressure Boundary
Reactor Vessel; Dutchman Forging	M-1 Pressure Boundary M-4 Structural Support
Reactor Vessel; Bottom Head	M-1 Pressure Boundary
Reactor Vessel; Core Guide Lugs	M-10 Reactor Vessel Internals Support
Reactor Vessel; Instrument Tubes (Bottom Head)	M-1 Pressure Boundary
Reactor Vessel; Head Vent Pipe	M-1 Pressure Boundary
Reactor Vessel; Support Skirt	M-4 Structural Support
Reactor Vessel Internals; Plenum Cover Assembly	M-9 Core Support
Reactor Vessel Internals; Plenum Cylinder	M-9 Core Support
Reactor Vessel Internals; Reinforcing Plates	M-9 Core Support
Reactor Vessel Internals; Top Flange-to-Cover Bolts	M-9 Core Support
Reactor Vessel Internals; Bottom Flange-to-Upper Grid Screws	M-9 Core Support
Reactor Vessel Internals; Plenum Rib Pads	M-9 Core Support
Reactor Vessel Internals; Upper Grid Rib Section	M-9 Core Support
Reactor Vessel Internals; Upper Grid Rib Forging	M-9 Core Support
Reactor Vessel Internals; Fuel Assembly Support Pads (Upper Grid Assembly)	M-9 Core Support
Reactor Vessel Internals; Rib-to-Ring Screws	M-9 Core Support

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

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Reactor Vessel Internals; CRGT Pipe and Flange	M-9 Core Support
Reactor Vessel Internals; CRGT Spacer Casting	M-9 Core Support
Reactor Vessel Internals; CRGT Spacer Screws	M-9 Core Support
Reactor Vessel Internals; CRGT Flange-to- Upper Grid Screws	M-9 Core Support
Reactor Vessel Internals; CRGT Rod Guide Tubes	M-9 Core Support
Reactor Vessel Internals; CRGT Rod Guide Sectors	M-9 Core Support
Reactor Vessel Internals; Core Support Shield Cylinder (Top and Bottom Flange)	M-9 Core Support
Reactor Vessel Internals; Core Support Shield-to-Core Barrel Bolts	M-9 Core Support
Reactor Vessel Internals; Outlet and Vent Valve Nozzles	M-10 Reactor Vessel Internals Support
Reactor Vessel Internals; Vent Valve Body and Retaining Ring	M-10 Reactor Vessel Internals Support
Reactor Vessel Internals; Vent Valve Assembly Locking Device	M-10 Reactor Vessel Internals Support
Reactor Vessel Internals; Core Barrel Cylinder (Top and Bottom Flange)	M-9 Core Support
Reactor Vessel Internals; Lower Internals Assembly-to-Core Barrel Bolts	M-9 Core Support
Reactor Vessel Internals; Core Barrel-to-Thermal Shield Bolts	M-9 Core Support
Reactor Vessel Internals; Baffle Plates and Formers	M-9 Core Support
Reactor Vessel Internals; Baffle/Former Bolts and Screws	M-9 Core Support
Reactor Vessel Internals; Surveillance Specimen Holder Bolts	M-9 Core Support
Reactor Vessel Internals; Lower Grid Rib Section	M-9 Core Support
Reactor Vessel Internals; Fuel Assembly Support Pads (Lower Grid Assembly)	M-9 Core Support
Reactor Vessel Internals; Lower Grid Rib- to-Shell Forging Screws	M-9 Core Support
Reactor Vessel Internals; Lower Grid Flow Distributor Plate	M-9 Core Support
Reactor Vessel Internals; Orifice Plugs	M-9 Core Support
Reactor Vessel Internals; Lower Grid and Shell Forgings	M-9 Core Support
Reactor Vessel Internals; Lower Internals Assembly-to-Thermal Shield Bolts	M-9 Core Support
Reactor Vessel Internals; Guide Blocks and Bolts	M-9 Core Support
Reactor Vessel Internals; Shock Pads and Bolts	M-9 Core Support
Reactor Vessel Internals; Support Post Pipes	M-9 Core Support
Reactor Vessel Internals; Incore Guide Tube Spider Castings	M-9 Core Support
Reactor Vessel Internals; Incore Guide Tube Components	M-9 Core Support
Reactor Vessel Internals; Flow Distributor Head and Flange	M-9 Core Support

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

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Reactor Vessel Internals; Shell Forging-to-Flow Distributor Bolts	M-9 Core Support
Reactor Vessel Internals; Incore Guide Support Plate	M-9 Core Support
Reactor Vessel Internals; Clamping Ring	M-9 Core Support
Reactor Vessel Internals; Thermal Shield	M-11 Reactor Vessel Shielding
RCPB Piping; Upper and Lower Cold Leg	M-1 Pressure Boundary
RCPB Piping; Reactor Coolant Pump Safe Ends	M-1 Pressure Boundary
RCPB Piping; Reactor Coolant Pump Safe End Welds	M-1 Pressure Boundary
RCPB Piping; Upper and Lower Cold Leg Drain, Instrumentation, and RTE Connections	M-1 Pressure Boundary
RCPB Piping; Hot Leg	M-1 Pressure Boundary
RCPB Piping; Flow Meter Assembly	M-1 Pressure Boundary
RCPB Piping; Flow Meter Branch Connections	M-1 Pressure Boundary
RCPB Piping; Hot Leg Instrumentation and RTE Connections	M-1 Pressure Boundary
RCPB Piping; Hot Leg High Point Vent Branch Connection	M-1 Pressure Boundary
RCPB Piping; Surge Line	M-1 Pressure Boundary
RCPB Piping; Hot Leg Surge Line Nozzle	M-1 Pressure Boundary
RCPB Piping; Hot Leg Surge Line Nozzle Safe End	M-1 Pressure Boundary
RCPB Piping; Hot Leg Surge Nozzle Weld	M-1 Pressure Boundary
RCPB Piping; Spray Line	M-1 Pressure Boundary
RCPB Piping; Class 1 piping, fittings and branch connections < NPS 4	M-1 Pressure Boundary
RCPB Piping; High Point Vent and Post Accident Sampling Flow Restrictors	M- 1 Pressure Boundary M- 3 Throttle
RCPB Piping; Decay Heat Removal Drop Line	M-1 Pressure Boundary
RCPB Piping; Decay Heat Removal Drop Line Nozzle	M-1 Pressure Boundary
RCPB Piping; Decay Heat Removal Drop Line Nozzle Weld	M-1 Pressure Boundary
RCPB Piping; Decay Heat Removal Drop Line Safe End	M-1 Pressure Boundary
RCPB Piping; Core Flood Line	M-1 Pressure Boundary
RCPB Piping; High Pressure Injection System Makeup & Letdown Lines	M-1 Pressure Boundary
RCPB Piping; High Pressure Injection System Makeup & Letdown Line Safe Ends	M-1 Pressure Boundary
RCPB Piping; High Pressure Injection System Makeup & Letdown Line Welds	M-1 Pressure Boundary
RCPB Piping; High Pressure Injection System Makeup Thermal Sleeves	M-6 Thermal Insulation
Reactor Coolant Pump; Casings and Covers	M-1 Pressure Boundary
Reactor Coolant Pump; Thermowells	M-1 Pressure Boundary
Reactor Coolant Pump; Studs and Nuts	M-1 Pressure Boundary
Reactor Coolant Pump; Thermal Barrier Heat Exchangers	M-1 Pressure Boundary

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

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Reactor Coolant Pump; Seal Coolers	M-1 Pressure Boundary
RCPB Piping; Class 1 Valve Bodies	M-1 Pressure Boundary
RCPB Piping; Closure Bolting	M-1 Pressure Boundary
Pressurizer; Shell	M-1 Pressure Boundary
Pressurizer; Lower Head	M-1 Pressure Boundary
Pressurizer; Upper Head	M-1 Pressure Boundary
Pressurizer; Heater Belt Forgings	M-1 Pressure Boundary
Pressurizer; Spray Line Nozzle	M-1 Pressure Boundary
Pressurizer; Pressure Relief Nozzle	M-1 Pressure Boundary
Pressurizer; Pressure Relief Nozzle Weld	M-1 Pressure Boundary
Pressurizer; Vent and Sampling Nozzle	M-1 Pressure Boundary
Pressurizer; Surge Line Nozzle	M-1 Pressure Boundary
Pressurizer; Surge Line Nozzle Thermal Sleeve	M-6 Thermal Insulation
Pressurizer; Spray Line Nozzle Thermal Sleeve	M-6 Thermal Insulation
Pressurizer; Level Sensing Nozzles	M-1 Pressure Boundary
Pressurizer; Sampling Nozzle	M-1 Pressure Boundary
Pressurizer; Thermowell	M-1 Pressure Boundary
Pressurizer; Spray Line Nozzle Safe End and Weld	M-1 Pressure Boundary
Pressurizer; Surge Line Nozzle Safe End	M-1 Pressure Boundary
Pressurizer; Surge Line Nozzle Safe End Weld	M-1 Pressure Boundary
Pressurizer; Manway	M-1 Pressure Boundary
Pressurizer; Manway Covers/Insert	M-1 Pressure Boundary
Pressurizer; Manway Studs and Nuts	M-1 Pressure Boundary
Pressurizer; Heater Bundle Cover Plate	M-1 Pressure Boundary
Pressurizer; Heater Bundle Diaphragm Plate	M-1 Pressure Boundary
Pressurizer; Immersion Heater Sheath	M-1 Pressure Boundary
Pressurizer; Immersion Heater End Plug	M-1 Pressure Boundary
Pressurizer; Heater Bundle Studs and Nuts	M-1 Pressure Boundary
Pressurizer; Support Plate Assemblies	M-4 Structural Support
Steam Generator; Upper and Lower Heads	M-1 Pressure Boundary
Steam Generator; Tubesheets	M-1 Pressure Boundary
Steam Generator; Primary Nozzles	M-1 Pressure Boundary
Steam Generator; Shell Assembly	M-1 Pressure Boundary
Steam Generator; Baffle Assemblies	M-4 Structural Support
Steam Generator; Main Feedwater Spray Nozzle Flanges	M-1 Pressure Boundary
Steam Generator; Main Feedwater Nozzle Spray Plates	M-8 Spray Pattern
Steam Generator; Auxiliary Feedwater Nozzle Flanges	M-1 Pressure Boundary

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

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Steam Generator; Auxiliary Feedwater Nozzle Thermal Sleeves	M-6 Thermal Insulation
Steam Generator; Auxiliary Feedwater Nozzle Inlet Headers	M-1 Pressure Boundary
Steam Generator; Main Feedwater Nozzle Inlet Headers	M-1 Pressure Boundary
Steam Generator; Auxiliary Feedwater and Main Feedwater Closure Bolting	M-1 Pressure Boundary
Steam Generator; Main Feedwater Nozzle Inlet Header Support Plates and Gussets	M-4 Structural Support
Steam Generator; Steam Outlet Nozzle	M-1 Pressure Boundary
Steam Generator; Primary Side Drain Nozzles	M-1 Pressure Boundary
Steam Generator; Secondary Side Nozzles (Vent, Drain, and Instrumentation)	M-1 Pressure Boundary
Steam Generator; Primary Manway and Inspection Opening Covers and Backing Plates	M-1 Pressure Boundary
Steam Generator; Primary Manway and Inspection Opening Bolting	M-1 Pressure Boundary
Steam Generator; Secondary Manway and Handhole Opening Covers	M-1 Pressure Boundary
Steam Generator; Secondary Manway and Handhole Opening Bolting	M-1 Pressure Boundary
Steam Generator; Transition Ring and Support Skirt Items	M-4 Structural Support
Steam Generator; Tubes and Sleeves	M- 1Pressure Boundary M- 5 Heat Transfer
Steam Generator; Tube Plugs	M-1 Pressure Boundary
Steam Generator; Tube Support Plate Assembly (Tube Support Plates)	M-4 Structural Support
Steam Generator; Tube Support Plate Assembly (Support Rods)	M-4 Structural Support
Steam Generator; Tube Support Plate Assembly (Spacers, Nuts, Keys, and Wedges)	M-4 Structural Support
Piping, piping components, and piping elements	M-1 Pressure Boundary
Expansion Joint	M-1 Pressure Boundary
Flexible Metal Hose	M-1 Pressure Boundary
Reactor Coolant Pump; Motor Air Cooling Heat Exchangers	M-1 Pressure Boundary
Reactor Coolant Pump; Motor Lower Bearing Cooling Coils	M-1 Pressure Boundary
Reactor Coolant Pump; Oil Lift Pumps	M-1 Pressure Boundary
Reactor Coolant Pump; Motor Upper Bearing Cooling Heat Exchangers	M-1 Pressure Boundary
Insulation (Reactor Vessel and Piping)	M-6 Thermal Insulation

2.3.1.2 Control Rod Drive Control System

System Description

The Control Rod Drive Control System moves the control rods into and out of the reactor core to control reactor power level in response to reactivity effects caused by doppler, xenon, and moderator coefficient changes and in response to operator actions. The Control Rod Drive Control System also provides rapid rod insertion in response to protection system commands, thereby shutting down the reactor.

The Control Rod Drive Control System is designed for manual startup of the reactor followed by automatic operation via the Integrated Control System. Upon detection of Control Rod Drive Control System faults, further movement of rods out of the core is inhibited, and the Integrated Control System may be signaled to initiate a runback, i.e., a controlled reduction in power. The Reactor Protection System is able to trip the rods to shut down the reactor whenever it detects limiting conditions in the RCS.

The Control Rod Drive Control System safety considerations are: (1) the control rod assemblies are inserted into the core upon receipt of Reactor Protection System trip signals, (2) the trip command has priority over all other commands, and (3) no single failure shall inhibit the protective action of the Control Rod Drive Control System.

The Control Rod Drive Control System startup and operational considerations include: (1) reactivity regulation during startup is manual only, (2) out movement during periods of high neutron flux startup rate is inhibited by interlocks, (3) movement during power operation is manual via the operator or automatic via the Integrated Control System, (4) continuous position indication of each rod is provided, (5) monitoring of routine functions for faults is provided, and (6) zero power physics testing is accommodated.

Each of the 68 control rod drive mechanisms (CRDMs) is an electro-mechanical device consisting of an electrically driven rotating nut assembly within a pressure boundary, a four-pole, six-phase stator mounted outside the pressure boundary, and a leadscrew. These components combine to produce linear travel of the leadscrew and control rod assembly. Each control rod drive mechanism is associated with a control rod assembly, attached to the leadscrew by a coupling. The control rod drive mechanism positions its associated control rod within the reactor core and indicates the vertical location of the control rod with respect to the reactor core. The mechanisms and their associated control rod assemblies are divided into eight groups. Control rod groups 1, 2, 3, and 4 are referred to as safety groups. During reactor operation, the safety groups are maintained in their full-out position. The function of the safety groups is to provide adequate shutdown capability following a reactor trip. Groups 5, 6, and 7, which are referred to as the regulating groups, are used to establish criticality and to control the power output of the core. The group 8 control rods, which are referred to as the axial power shaping rods, are used to control the axial flux distribution in the core.

The Control Rod Drive Control System motor tube forms part of the primary pressure boundary.

The Control Rod Drive Control System interfaces with the Anticipated Transients Without Scram System; however it is not considered to be an ATWS mitigation system. The Diverse Scram System is a subsystem of the Anticipated Transients Without Scram System, and actuates on high RCS pressure as a backup trip to the Reactor Protection System. Control Rod Groups 5 through 7 are inserted into the core by interrupting the power to the regulating rods upon Diverse Scram System actuation.

The Control Rod Drive Control System also includes the Control Rod Drive Mechanism Jib Crane, which is designed and installed to prevent its structural failure in a seismic event. Cranes are addressed as civil/structural components within the structure that houses them.

The Control Rod Drive Control System is in the scope of License Renewal because it contains:

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

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

FSAR and Drawing References

The Control Rod Drive Control System is described in FSAR Sections 3.1.2.4.3, 3.2.4.3, and 7.2.2. FSAR Figure 3-66 shows a vertical section view of the Control Rod Drive.

There are no License Renewal scoping drawings that depict the Control Rod Drive Control System.

Components Subject to Aging Management Review

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

TABLE 2.3.1-2 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CONTROL ROD DRIVE CONTROL SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
CRDM Closure Insert and Vent Assemblies	M-1 Pressure-Boundary
CRDM Motor Tube Assembly	M-1 Pressure-Boundary
CRDM Stator Cooling Water Flexible Metal Hose	M-1 Pressure-Boundary
CRDM Stator Cooling Water Jacket Assemblies	M-1 Pressure-Boundary

2.3.1.3 Incore Monitoring System

System Description

The Incore Monitoring System provides neutron flux detectors to monitor core performance and thermocouples to monitor reactor core temperatures. Incore, self-powered neutron detectors measure the neutron flux in the core to provide a history of power distribution during power operation. Data obtained provides power distribution information and fuel burnup data to assist in fuel management. The Plant Computer System provides normal system readout.

The Incore Monitoring System consists of assemblies of self-powered neutron detectors and thermocouples located at 52 positions within the core. In this arrangement, an incore detector assembly consisting of seven local flux detectors, one thermocouple, and one background detector is installed in the instrumentation tube of each of 52 fuel assemblies. The background detector compensates for gamma induced background currents in the self-powered neutron detector leadwires. The local detectors are positioned at seven different axial elevations within the core to provide the axial flux gradient. Sixteen of the 52 incore probe monitoring cables have been replaced with Class 1E qualified cable as part of the Inadequate Core Cooling System design. These 16 qualified incore thermocouples are referred to as Core Exit Thermocouples and are separated into two channels of eight thermocouples each. Each channel has two thermocouples per core quadrant. Channel A and Channel B thermocouples, and their associated 1E cables, are routed through Containment penetrations. From the penetration, the cabling is routed to panel recorders on the Main Control Board to meet the post-accident monitoring requirements of Revision 3 of Regulatory Guide 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident." In addition, the 16 incore thermocouple signals are passed from the panel recorders to the Safety Parameter Display System (SPDS) computers, where the temperatures are used for the subcooling margin calculation. The SPDS computers are part of the Emergency Monitoring System. Components of the Incore Monitoring System support the Reactor Coolant Pressure Boundary function.

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

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

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

3. Components that are part of the EQ Program.

FSAR and Drawing References

The Incore Monitoring System is described in FSAR Sections 7.3.3 and 7.3.4.

The Incore Monitoring System is not shown on the License Renewal scoping drawings.

Components Subject to Aging Management Review

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

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

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Incore Monitoring System Lines	M-1 Pressure-Boundary

2.3.2 ENGINEERED SAFETY FEATURES SYSTEMS

This Subsection addresses the Engineered Safety Features (ESF) Systems that consist of systems and components designed to function under accident conditions to minimize the severity of an accident or to mitigate the consequences of an accident. The introduction of Chapter 6 of the CR-3 FSAR identifies these systems as Engineered Safeguards and states that Engineered Safeguards include provisions for:

a. High Pressure Injection by the Make Up & Purification System.
b. Low Pressure Injection by the Decay Heat Removal System.
c. Core flooding by the Core Flood System.
d. Reactor Building cooling by the Reactor Building Recirculation System.
e. Reactor Building cooling by the Reactor Building Spray System.
f. Reactor Building isolation.
g. Removal of fission products in the Reactor Building atmosphere by the Reactor Building Spray System.
h. Reactor core decay heat removal for certain sized Small Break Loss of Coolant Accidents (LOCAs) by Emergency Feedwater addition to steam generators.

Automatic actuation of ESF systems is performed by the Engineered Safeguards Actuation System, and emergency electrical power to the ESF systems is provided by the Emergency Diesel Generators. Note that every ESF system is not addressed in this Subsection. To achieve better alignment with the License Renewal aging management information in NUREG-1801, some of the ESF systems are discussed in other Subsections as indicated below.

a. Reactor Building Recirculation System (Refer to Subsection 2.3.3.2)
b. Emergency Diesel Generators (Refer to Subsection 2.3.3.33)
c. Make Up & Purification System (Refer to Subsection 2.3.3.42)
d. Emergency Feedwater System (Refer to Subsection 2.3.4.8)

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

1. Reactor Building Spray System (Subsection 2.3.2.1)

2. Core Flood System (Subsection 2.3.2.2)

3. Decay Heat Removal System (Subsection 2.3.2.3)

4. Engineered Safeguards Actuation System (Subsection 2.3.2.4)

5. Reactor Building Isolation System (Subsection 2.3.2.5)

2.3.2.1 Reactor Building Spray System

System Description

The Reactor Building Spray system is designed to:

1. Furnish Reactor Building (RB) atmosphere cooling,
2. Limit post-accident RB pressure to less than the design value,
3. Reduce the RB to nearly atmospheric pressure, and
4. Remove the fission product iodine inventory from the RB atmosphere and assure the iodine collected in the Containment emergency sump does not revolatilize when sprayed back into the RB.

The RB Spray System serves only as an Engineered Safeguards (ES) System and performs no normal operating function.

The RB Spray System consists of two redundant subsystems. Each subsystem contains one RB spray header, a pump, associated piping, valving, and instrumentation. Each RB Spray Pump is capable of delivering design flow at RB design pressure. The spray headers are located in the RB dome, and contain spray nozzles arranged to provide maximum "washing" of the RB atmosphere. The pumps take suction from the same header as the Low Pressure Injection (LPI) pumps; therefore, the two systems have common piping back to the suction sources consisting of the Containment emergency sump and the Borated Water Storage Tank (BWST). The two pumps are arranged in parallel with an ES actuation signal-operated stop valve in the suction and discharge lines of each pump. A crossover between the two RB spray header supply lines contains double manual valves with a test line for recirculation of borated water from the RB Spray Pumps. The RB Spray Pumps and remotely operated valves may be operated from the control room.

The RB Spray System is sized to furnish more than 100% of the design cooling capacity and 200% of the design iodine removal capability with both of the spray paths in operation. Each RB Spray System train is independent of the other train, and the entire RB Spray System is independent of the RB Recirculation System. In the event of a Large Break LOCA, the RB Spray System will spray the RB with a water solution containing boric acid. Following Emergency Core Cooling System (ECCS) switchover from the BWST to the emergency sump, the water solution will contain boric acid and trisodium phosphate dodecahydrate (TSP-C). This mixture of water, boric acid, and TSP-C will continue to remove the post-accident energy and fission products. The RB Spray System pumps and associated valves are located in the Auxiliary Building. RB Spray System components support the Containment pressure boundary function and perform a post-accident monitoring function.

The tanks that previously contained NaOH solution for pH control have been abandoned in place; however, they are still in scope because they represent a potential spatial interaction concern.

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

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

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

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

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

FSAR and Drawing References

The RB Spray System is described in Section 6.2 of the CR-3 FSAR.

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

302-711-LR, Sheet 1 302-712-LR, Sheet 1

Components Subject to Aging Management Review

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

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

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment Isolation Piping and Components	M-1 Pressure-Boundary
Flow restricting elements	M-1 Pressure-Boundary M-3 Throttle

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

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary
Reactor Building Spray Nozzles	M-8 Spray Pattern
Reactor Building Spray Pumps	M-1 Pressure-Boundary
Reactor Building Spray Pumps Seal Water Cyclone Separator	M-1 Pressure-Boundary M-2 Filtration

2.3.2.2 Core Flood System

System Description

The Core Flood System is a subsystem of the Emergency Core Cooling System (ECCS) and provides core protection for intermediate and large RCS pipe failures. The Core Flood System is passive and requires no operator or control action to actuate. It automatically floods the core when the RCS pressure drops below 600 psig. The combined coolant volume in the two core flood tanks, plus the volume in the core flood tank lines, is sufficient to fill the reactor vessel to approximately the top of the core, accounting for liquid losses due to flow out of the break and boiling in the core. The driving force to inject the stored borated water into the Reactor Vessel is supplied by pressurized nitrogen, which occupies approximately one third of the core flood tank volume. Connections are provided for adding both borated water and nitrogen during power operation, so that the proper level and pressure may be maintained.

The discharge pipe from each Core Flood Tank is attached directly to a reactor vessel core flood nozzle. Each core flood line at the outlet of the core flood tanks contains an electrically operated stop valve adjacent to the tank and two in-line check valves in series. The stop valves at the Core Flood Tank outlet are open during reactor power operation; and, when the RC system pressure is higher than the Core Flood System pressure, the two check valves prevent high pressure reactor coolant from flowing into the Core Flood Tanks.

Major system components are the two 1,410 cu. ft. Core Flood Tanks, the electrically operated stop valve, and the two in-line check valves. The Core Flood System contains components that support the Containment isolation function, perform a post-accident monitoring function, and support the Reactor Coolant Pressure Boundary function.

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

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

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

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

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

FSAR and Drawing References

The Core Flood System is described in detail Section 6.1 of the CR-3 FSAR.

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

302-702-LR, Sheet 1

Components Subject to Aging Management Review

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

TABLE 2.3.2-2 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CORE FLOOD SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment Isolation Piping and Components	M-1 Pressure-Boundary
Core Flood Tanks	M-1 Pressure-Boundary
Piping Insulation	M-6 Thermal Insulation
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.2.3 Decay Heat Removal System

System Description

During normal operation, the Decay Heat Removal System provides controlled cooldown of the RCS when coolant temperature is below 280°F. The system maintains decay heat removal from the core during Reactor shutdown and refueling. It also provides decay heat removal and purification/chemistry control during cold shutdown and refueling. During accident conditions, the LPI portion of the Decay Heat Removal System injects borated water into the reactor vessel for emergency cooling and reactivity control. LPI is a subsystem of the ECCS, and credit is taken for LPI following a LOCA. Normal decay heat removal is also credited in the Steam Generator Tube Rupture (SGTR) Accident description in the FSAR.

The safety functions of the Decay Heat Removal System after a LOCA include:

1. Provides borated water to the core for short term cooling and reactivity control,
2. Provides long term core cooling and reactivity control by recirculation of borated water from the Reactor Building sump,
3. Provides suction for the Make Up & Purification pumps for High Pressure Injection (HPI)/recirculation following a small break LOCA,
4. Ensures cross flow through the core to prevent boron stratification/precipitation in the core,
5. Provides borated water for HPI, LPI, and RB Spray functions, and
6. Supports Containment heat removal by cooling the RB sump fluid during recirculation.

The operational functions of the Decay Heat Removal System include:

1. Decay heat removal for controlled plant cooldown,
2. Supplying auxiliary pressurizer spray,
3. Drain and fill of the fuel transfer canal, and
4. Cooling for the spent fuel pool.

The Decay Heat Removal System consists of two decay heat removal pumps, two decay heat removal heat exchangers, the Borated Water Storage Tank (BWST), inter-connecting piping, and motor-operated control and isolation valves required for normal and emergency system operation. The Decay Heat Removal System includes two redundant cooling trains, each train is capable of providing 100% of the heat removal requirements for a normal reactor shutdown, LOCA emergency cooling, or holding operations (refueling and shutdown operations). Each decay heat removal heat exchanger is cooled by its own Decay Heat Closed Cycle Cooling System train. Each independent Decay Heat Closed Cycle Cooling System train is cooled by its associated Nuclear Service and Decay Heat Sea Water System train. During power operation, the Decay Heat Removal System is aligned for automatic LPI actuation. In the event of a

LOCA, the system will automatically deliver water from the BWST to the reactor vessel through the core flood nozzle penetration. When the BWST volume is depleted, the Decay Heat/LPI pumps can be aligned to take a suction from the RB Sump. In this lineup, long term cooling of the reactor is provided by cooling the sump water using the decay heat removal heat exchangers and returning the water to the Reactor Vessel. If the swapover from the BWST to the RB Sump occurs while RCS pressure is greater than the shutoff head of the Decay Heat/LPI pumps, the discharge from the decay heat removal heat exchangers is directed to the HPI pumps for return to the RCS.

The Decay Heat Removal System contains components that support Containment isolation, Reactor Coolant Pressure Boundary, and post-accident monitoring functions. Certain valves in the system are encapsulated for containment isolation; the encapsulations are civil/structural commodities and are addressed in Section 2.4.

The Decay Heat Removal System is in the scope of License Renewal, because it contains:

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

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

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

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

FSAR and Drawing References

The Decay Heat Removal System is described in Sections 6.1 and 9.4 of the FSAR.

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

302-641-LR, Sheet 1 302-641-LR, Sheet 2

Components Subject to Aging Management Review

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

TABLE 2.3.2-3 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: DECAY HEAT REMOVAL SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Borated Water Storage Tank	M-1 Pressure-Boundary
Closure bolting	M-1 Pressure-Boundary
Containment Isolation Piping and Components	M-1 Pressure-Boundary
Decay Heat Removal Heat Exchanger Components	M-1 Pressure-Boundary
Decay Heat Removal Heat Exchanger Tubes	M-5 Heat Transfer
Decay Heat Pump Seal Water Cyclone Separator	M-1 Pressure-Boundary M-2 Filtration
Decay Heat Pumps	M-1 Pressure-Boundary
Flow restricting elements	M-1 Pressure-Boundary M-3 Throttle
Orifice (miniflow recirculation)	M-1 Pressure-Boundary M-3 Throttle
Piping Insulation	M-6 Thermal Insulation
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.2.4 Engineered Safeguards Actuation System

System Description

The ES Actuation System monitors process variables and provides an initiation signal to provide the following protective functions: protect the fuel cladding, ensure RB integrity, limit the maximum value of energy released by an accident, remove fission products from the RB atmosphere in the event of a LOCA, and prevent overloading the Emergency Diesel Generators in the event of a Loss Of Offsite Power (LOOP) coincident with an accident. The ES Actuation System performs these functions by detecting an accident and providing automatic actuation of the ES Systems required to obtain:

1. Emergency core cooling (HPI and LPI);
2. RB cooling and isolation;
3. Emergency Feedwater (EFW) Actuation; and
4. RB spray.

In addition, the ES Actuation System provides miscellaneous interlocks and alarms to initiate Emergency Diesel Generator operation, close and prevent opening of the Decay Heat dropline valves, provide manual actuation of each level of protection, provide bypass for the HPI and LPI to permit normal RCS depressurization, and to identify actuation system and device status.

The ES Actuation System is designed for detection and actuation of equipment required to mitigate accidents as discussed in FSAR Chapter 14.

The ES Actuation System is a three channel redundant system that employs at least three independent detectors for each variable monitored by the system. Each set of three channels is arranged in a 2-out-of-3 actuation logic for each monitored variable. The system will tolerate the failure of one of the three channels or its associated monitoring device without losing the ability to perform its intended functions. Redundancy is accomplished by using two actuation trains designated "A" and "B", each employing two sets of three channels for each Engineered Safety Features system actuated. The loss of essential service bus voltage to the channel instrumentation servicing the system will initiate a trip of the logic associated with the related instrument channel. The loss of two essential service buses will actuate all ES Actuation System systems except the RB Spray system.

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

1. Components that are safety related and are relied upon to remain functional during and following design basis events,
2. Components that are relied on during postulated fires and station blackout events, and
3. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The ES Actuation System is described in detail in Sections 6 and 7.1.3 of the CR-3 FSAR. Also, refer to FSAR Figure 7-5.

The ES Actuation System components that are in scope for License Renewal are electrical/instrumentation and control (I&C) components and associated supports. No License Renewal boundary drawings are provided.

Components Subject to Aging Management Review

The mechanical components in scope for License Renewal are cabinet-mounted fans. The fans have been screened as active equipment having no passive components. Therefore, the cabinet fans do not require an AMR. The ES Actuation System components that are subject to AMR are addressed as electrical/I&C component and commodities in Section 2.5 or as civil commodities in Section 2.4.

2.3.2.5 Reactor Building Isolation System

System Description

The RB Isolation System closes fluid penetrations not required for operation of ES systems in order to prevent leakage of radioactive materials to the environment. RB isolation occurs on a signal of high pressure in the RB. In addition, automatic isolation of systems not required for containment or RCS heat removal occurs upon automatic actuation of HPI.

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

Systems that include Containment isolation valves are:

1. Air Handling Ventilation and Cooliing System
2. RB Purge System
3. RB Spray System
4. Chemical Addition System
5. Liquid Sampling System
6. Post Accident Liquid Sampling System
7. Core Flood System
8. OTSG Chemical Cleaning System
9. Industrial Cooling System
10. Decay Heat Removal System
11. Demineralized Water System
12. Fire Protection System
13. Main Feedwater System
14. Instrument Air System
15. Leak Rate Test System
16. Main Steam System
17. Make Up & Purification System
18. Nitrogen Supply System
19. RB Airlock System
20. Station Air System
21. Spent Fuel Cooling System
22. Nuclear Services Closed Cycle Cooling System
23. Waste Disposal System
24. Radioactive Gas Waste Disposal System
25. Radioactive Liquid Waste Disposal System
26. Post-Accident Containment Atmospheric Sampling System

Isolation valves for these systems are listed in Table 5-9 of the FSAR and are included in the screening results described elsewhere in this Section for the above systems.

FSAR and Drawing References

The RB Isolation System is described in Section 5.3 of the CR-3 FSAR.

The License Renewal scoping boundaries for the RB Isolation System are identified in the discussion of the applicable systems that include RB isolation valves elsewhere in this Section.

Components Subject to Aging Management Review

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

2.3.3 AUXILIARY SYSTEMS

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

1. Air Handling Ventilation and Cooling System (Subsection 2.3.3.1)
2. Reactor Building Recirculation System (Subsection 2.3.3.2)
3. Reactor Building Miscellaneous Ventilation System (Subsection 2.3.3.3)
4. Reactor Building Purge System (Subsection 2.3.3.4)
5. Auxiliary Building Supply System (Subsection 2.3.3.5)
6. Fuel Handling Area Supply System (Subsection 2.3.3.6)
7. Decay Heat Closed Cycle Pump Cooling System (Subsection 2.3.3.7)
8. Spent Fuel Coolant Pump Cooling System (Subsection 2.3.3.8)
9. Spent Fuel Pit Supply System (Subsection 2.3.3.9)
10. Auxiliary Building Exhaust System (Subsection 2.3.3.10)
11. Control Complex Ventilation System (Subsection 2.3.3.11)
12. Emergency Diesel Generator Air Handling System (Subsection 2.3.3.12)
13. Miscellaneous Area HVAC System (Subsection 2.3.3.13)
14. Turbine Building Ventilation System (Subsection 2.3.3.14)
15. Penetration Cooling System (Subsection 2.3.3.15)
16. Emergency Feedwater Initiation and Control Room HVAC System (Subsection 2.3.3.16)
17. Appendix R Control Complex Dedicated Cooling Supply System (Subsection 2.3.3.17)
18. Emergency Feedwater Pump Building Ventilation System (Subsection 2.3.3.18)

19. Chemical Addition System (Subsection 2.3.3.19)
20. Liquid Sampling System (Subsection 2.3.3.20)
21. Post Accident Liquid Sampling System (Subsection 2.3.3.21)
22. Control Complex Chilled Water System (Subsection 2.3.3.22)
23. Appendix R Chilled Water System (Subsection 2.3.3.23)
24. Industrial Cooling System (Subsection 2.3.3.24)
25. Circulating Water System (Subsection 2.3.3.25)
26. EFP-3 Diesel Air Starting System (Subsection 2.3.3.26)
27. Decay Heat Closed Cycle Cooling System (Subsection 2.3.3.27)
28. Fuel Oil System (Subsection 2.3.3.28)
29. Jacket Coolant System (Subsection 2.3.3.29)
30. Diesel Generator Lube Oil System (Subsection 2.3.3.30)
31. Domestic Water System (Subsection 2.3.3.31)
32. Demineralized Water System (Subsection 2.3.3.32)
33. Emergency Diesel Generator System (Subsection 2.3.3.33)
34. Floor Drains System (Subsection 2.3.3.34)
35. Fuel Handling System (Subsection 2.3.3.35)
36. Fire Protection System (Subsection 2.3.3.36)
37. Hydrogen Supply System (Subsection 2.3.3.37)
38. Instrument Air System (Subsection 2.3.3.38)
39. Reactor Coolant Pump Lube Oil Collection System (Subsection 2.3.3.39)
40. Leak Rate Test System (Subsection 2.3.3.40)
41. Miscellaneous Drains System (Subsection 2.3.3.41)

42. Make Up & Purification System (Subsection 2.3.3.42)

43. Miscellaneous Mechanical & Structures System (Subsection 2.3.3.43)

44. Nitrogen Supply System (Subsection 2.3.3.44)

45. Penetration Cooling Auxiliary System (Subsection 2.3.3.45)

46. Reactor Building Airlock System (Subsection 2.3.3.46)

47. Roof Drains System (Subsection 2.3.3.47)

48. Radiation Monitoring System (Subsection 2.3.3.48)

49. Nuclear Service and Decay Heat Sea Water System (Subsection 2.3.3.49)

50. Station Air System (Subsection 2.3.3.50)

51. Secondary Services Closed Cycle Cooling Water System (Subsection 2.3.3.51)

52. Station Drains System (Subsection 2.3.3.52)

53. Spent Fuel Cooling System (Subsection 2.3.3.53)

54. Nuclear Services Closed Cycle Cooling System (Subsection 2.3.3.54)

55. Waste Disposal System (Subsection 2.3.3.55)

56. Radioactive Gas Waste Disposal System (Subsection 2.3.3.56)

57. Radioactive Liquid Waste Disposal System (Subsection 2.3.3.57)

58. Reactor Coolant and Miscellaneous Waste Evaporator System (Subsection 2.3.3.58)

59. Waste Gas Sampling System (Subsection 2.3.3.59)

60. Waste Sampling System (Subsection 2.3.3.60)

61. Post Accident Containment Atmospheric Sampling (Subsection 2.3.3.61)

2.3.3.1 Air Handling Ventilation and Cooling System

System Description

The Air Handling Ventilation and Cooling System is not described as an independent system in the FSAR. The system includes many safety related and non-safety related equipment types located in various buildings. System components include: fans, air handling units, dampers, air reservoirs/accumulators, the Emergency Feedwater Pump No. 3 (EFP-3) diesel air intake filter, EFP-3 diesel exhaust pipe flexible expansion joint, EFP-3 diesel exhaust silencer, and Containment isolation valve test connections. The Air Handling Ventilation and Cooling System components provide high temperature and fire alarm signals to the Fire Protection System, form part of the Containment pressure boundary, and perform a post-accident monitoring function. The system includes the EFW Pump Building battery room air handling unit, temperature indicating circuits for the RB and diesel generator room, pressure indication for the EFP-3 air intake filter, air reservoirs for pneumatic dampers, fire dampers in the non-vital battery and charger rooms in the TB, and components in the control circuits for RB Cooling Units and Containment Purge Isolation valves.

The Air Handling Ventilation and Cooling System is in the scope of License Renewal, because it contains:

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

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

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

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

FSAR and Drawing References

The Air Handling Ventilation and Cooling System is not described in the FSAR.

The components in the Air Handling Ventilation and Cooling System do not compose a functional flow path. The components are located in various systems and in various plant locations. The following drawings show several components in the system. (Scoping drawings have been submitted separately for information only.)

302-751-LR, Sheet 1	302-753-LR, Sheet 1	302-753-LR, Sheet 2
302-754-LR, Sheet 1	302-754-LR, Sheet 2	302-769-LR, Sheet 1
	302-778-LR, Sheet 1	

Components Subject to Aging Management Review

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

TABLE 2.3.3-1 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: AIR HANDLING VENTILATION AND COOLING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Ducting and components	M-1 Pressure-Boundary
Ducting closure bolting	M-1 Pressure-Boundary
EFP-3 Diesel Combustion Air Intake Filter Housing	M-1 Pressure-Boundary
EFP-3 Diesel Engine Exhaust Expansion Joints and Silencers	M-1 Pressure-Boundary
Fan Housings	M-1 Pressure-Boundary
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary

2.3.3.2 Reactor Building Recirculation System

System Description

The safety function of the Reactor Building (RB) Recirculation System is to maintain RB integrity by reducing the temperature and consequently the pressure inside Containment to the required design values following an accident. The removal of sensible and latent heat under emergency conditions ensures that the maximum Containment design temperature and pressure values are not exceeded.

The operational function of the RB Recirculation System (in conjunction with the RB Miscellaneous Ventilation System) is to a) maintain a uniform temperature in the RB during the integrated leak rate test, and b) maintain the RB average air temperatures below the limit of 130°F and above 60°F during normal operation. The system recirculates air through demisters and throughout the RB. The system provides normal and post-accident indication of RB ambient air temperature in the Control Room.

Major equipment in the RB Recirculation System includes three fan/cooler units. During normal operation, one or two fan/cooler units operate, dependent on RB heat load. During normal operation, the Industrial Cooling System has the capacity to supply all three fan/cooler units. The fan/cooler units are operated from the Control Room. Upon activation of the Engineered Safeguards (ES) signal, the fan/cooler units are automatically isolated from the Industrial Cooling System and switched to the Nuclear Services Closed Cycle Cooling System. During emergency operation, one fan operates.

Each fan/cooler unit contains two banks of roughing filters, two banks of cooling coils, and one axial flow fan. These filter, cool, and recirculate air throughout the RB. There is no discharge distribution ductwork for the system; the fans discharge directly into the Containment. The three trains share common return ductwork and registers that distribute the air from the various RB elevations into the fan/cooler units. The fan/cooler units are also called the RB Cooling Units. The cooler coils support the Containment pressure boundary function.

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

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

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

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

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

<u>FSAR and Drawing References</u>

The RB Recirculation System is described in Sections 6.3 and 9.7.2 of the CR-3 FSAR.

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

302-751-LR, Sheet 1

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

The table below identifies the RB Recirculation System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in

Table 3.3.2-2 Engineered Safety Features - Summary of Aging Management Evaluation – Reactor Building Recirculation System.

TABLE 2.3.3-2 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: REACTOR BUILDING RECIRCULATION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment Isolation Piping and Components	M-1 Pressure-Boundary
Ducting and components	M-1 Pressure-Boundary
Ducting Closure Bolting	M-1 Pressure-Boundary
Flexible Connections	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary
Reactor Building Fan Assembly Housings	M-1 Pressure-Boundary
Reactor Building Fan Assembly Cooling Coil Tubes	M-5 Heat transfer
Reactor Building Fan Assembly Cooling Coil Components	M-1 Pressure-Boundary
Reactor Building Fan Assembly Filter Housings	M-1 Pressure-Boundary
Reactor Building Fan Assembly Motor Cooler Tubes	M-5 Heat transfer
Reactor Building Fan Assembly Motor Cooler Components	M-1 Pressure-Boundary
Reactor Building Fan Assembly Fan Housings	M-1 Pressure-Boundary

2.3.3.3 Reactor Building Miscellaneous Ventilation System

System Description

RB Miscellaneous Ventilation System booster fans in the RB operate continuously during normal operation to supply air to the operating floors, steam generator compartments, and reactor compartment. These units are operated from the Control Room and are not required during an emergency. The RB Miscellaneous Ventilation System operates in conjunction with the RB Recirculation System, to maintain required RB temperatures during normal operation as well as during the integrated leak rate test. This system does not include safety-related components but does include non-safety related components with the potential to affect safety related components.

The RB Miscellaneous Ventilation System includes the following subsystems, major equipment and operational functions:

1. The RB Steam Generator Compartment Cooling subsystem utilizes two 100% capacity units with fans and separate motor operated discharge dampers connected to a common semi-ring distribution duct. The subsystem removes heat and provides airflow to the A and B steam generator compartments, letdown cooler room, and the incore instrumentation guide tube compartment.

2. The RB Air Supply subsystem consists of two 50% capacity units with separately mounted axial flow fans supplying the operating floor. There are no dampers associated with the operating floor fan subsystem. The subsystem provides mixing of air throughout the RB, utilizing a duct work arrangement during normal operations.

3. The RB Cavity Cooling subsystem consists of two 100% capacity systems with fan, cooling coils and motor operated discharge dampers. Cooling water is supplied from the Industrial Cooling System. The subsystem removes heat from the Reactor compartment cavity and nozzle penetration cavities. Air flows into the Reactor cavity and travels upward between the vessel insulation and the primary shield wall, protecting the adjacent walls from excessive heat. This airflow also provides an insulating barrier that protects the excore neutron detectors.

4. The Control Rod Drive (CRD) Cooling subsystem utilizes 12 fans spaced around the lower perimeter of the CRD mechanism service structure. Fans remove heat from the service structure by drawing air into the top of the service structure and discharging out the lower area. These units are operated locally at the Motor Control Center (MCC) and are not required in an emergency. The subsystem maintains the cable and connector temperatures around the CRD shroud below the cable and connector rated values.

The RB Miscellaneous Ventilation System is in the scope of License Renewal, because it contains:

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

FSAR and Drawing References

The RB Miscellaneous Ventilation System is described in detail in FSAR Sections 5.5 and 9.7.2.

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

302-751-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the RB Miscellaneous Ventilation System components and commodities requiring aging management review (AMR) and their intended functions.

The AMR results for these components/commodities are provided in Table 3.3.2-3 Auxiliary Systems – Summary of Aging Management Evaluation – Reactor Building Miscellaneous Ventilation System.

TABLE 2.3.3-3 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: REACTOR BUILDING MISCELLANEOUS VENTILATION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Ducting and components	M-1 Pressure-Boundary
Ducting closure bolting	M-1 Pressure-Boundary
Flexible Connections	M-1 Pressure-Boundary
Non-safety related cooling coil housings	M-1 Pressure-Boundary
Piping, piping components, and piping Elements	M-1 Pressure-Boundary
Reactor Building Fan Housings	M-1 Pressure-Boundary

2.3.3.4 Reactor Building Purge System

System Description

The RB Purge System operates as required during operating Modes 5 and 6. The RB Purge supply and exhaust subsystems are normally operated from the Control Room. The RB Purge Supply Fans take suction through a missile-proof intake assembly in the Intermediate Building, and discharge into the RB through ducts containing the outside-RB and inside-RB purge supply valves. Prior to entering the RB the purge supply air is filtered and electrically heated, if required. The system is designed to supply the RB at varying flow rates. Major equipment includes two 50% capacity purge supply units, each containing a heating coil and fan and two 50% capacity purge exhaust fans. One 100% capacity filter is provided outside of the RB upstream of the exhaust fans.

Purge air is circulated within the RB by various RB systems, such as, the RB Recirculation System. The exhaust subsystem filter employs two banks of roughing, high efficiency particulate air (HEPA), and charcoal filters. Discharge by the Purge Exhaust Fans is to the atmosphere through the plant vent. The Containment isolation valves are controlled manually from the Control Room and normally are locked closed during operating Modes 1 through 4.

The operational function of the RB Purge System is to provide ventilation to the RB for personnel comfort, reduce building airborne contamination and filter potentially contaminated particles and gases prior to discharging exhaust air into the atmosphere. The post-accident safety functions of the system are to maintain RB integrity, to provide a hydrogen purge discharge path from the RB, and to be capable of automatic isolation on an RB Purge-high radiation signal if required to mitigate the consequences of a fuel handling accident involving movement of recently irradiated fuel.

The RB Purge System contains components that form part of the Containment pressure boundary and perform a post-accident monitoring function.

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

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

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

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

FSAR and Drawing References

The RB Purge System is described in CR-3 FSAR Section 5.5 and 9.7.2.

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

302-751-LR, Sheet 1

Components Subject to Aging Management Review

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

TABLE 2.3.3-4 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: REACTOR BUILDING PURGE SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Air Handling Unit Housings	M-1 Pressure-Boundary
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Ducting and components	M-1 Pressure-Boundary
Ducting closure bolting	M-1 Pressure-Boundary

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

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Flexible Connections	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary
Reactor Building Purge Filter Housings	M-1 Pressure-Boundary
Reactor Building Purge Fan Housings	M-1 Pressure-Boundary
Screens	M-2 Filtration

2.3.3.5 Auxiliary Building Supply System

System Description

In the AB, the AB Supply System supply fans and two of the four exhaust fans from the AB and Fuel Handling Area, discussed in Subsection 2.3.3.10 below, operate continuously during normal plant operation to maintain a negative internal building pressure. Through an outside air louver, the AB Supply System utilizes two 50% capacity fans to supply filtered and tempered air at a nominal temperature. A nominal value recognizes that homogeneous mixing may not always occur throughout the building, but bulk average temperature will be maintained above 55°F for freeze protection and personnel comfort, and below the temperature maximum for electrical equipment environmental considerations. Supply and exhaust are arranged to direct this air from areas of low to higher concentrations of radioactivity.

The operational function of the system is to provide filtered and conditioned air to the AB. The supply fans discharge air through outlet dampers to a common supply duct that directs the air to centrally located distribution registers at various elevations of the AB. Branch ductwork carries supply air to the waste gas decay tank area, spent resin storage tank area, and to both decay heat pits.

The system operates continuously during normal plant operation. During an emergency resulting in high radiation detection in the AB exhaust vent, the supply fans automatically stop, but exhaust fans continue operation. This further increases the negative internal building pressure, thus assuring no uncontrolled leakage from the building.

In the event of high radiation from the waste gas surge tank area, supply and exhaust dampers to this area close and the AB supply fans stop. The AB Supply System is operated from the Control Room, with heating coils in the supply duct automatically controlled. Safety devices include: high temperature devices in the discharges from fans to stop fans and alarm in the Control Room on indication of high temperature, and flow switches to indicate loss of air flow. In case of fire, fans are stopped and appropriate dampers are closed. This system does not include safety related components but does include non-safety related components with the potential to affect safety related components. The AB Supply System is credited with functions required for fire protection.

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

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

2. Components that are relied on during postulated fires.

FSAR and Drawing References

The AB Supply System is described in CR-3 FSAR Section 9.7.2.

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

302-751-LR, Sheet 1

Components Subject to Aging Management Review

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

TABLE 2.3.3-5 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: AUXILIARY BUILDING SUPPLY SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Air Handling Unit Housings	M-1 Pressure Boundary
Auxiliary Building Fan Housings	M-1 Pressure Boundary
Ducting and components	M-1 Pressure Boundary
Ducting closure bolting	M-1 Pressure Boundary
Filter Housings	M-1 Pressure Boundary
Flexible Connections	M-1 Pressure Boundary
Piping, piping components, and piping elements	M-1 Pressure Boundary

2.3.3.6 Fuel Handling Area Supply System

System Description

The Fuel Handling Area Supply System utilizes one 100% capacity axial flow fan to supply air to the Fuel Handling Area. The system provides outside air through a louver, roughing filter, heating coils, fan and ductwork. The air sweeps across the Spent Fuel Area and is exhausted at the Spent Fuel Pool end of the AB by the AB Exhaust System (refer to Subsection 2.3.3.10). The Fuel Handling Area Supply System normally operates continuously; however, it would be inoperative during loss of offsite power or during post-accident periods where outside air should not be admitted. The fan is normally operated from the HVAC section of the Control Room.

The Fuel Handling Area is not an isolated portion of the AB, and the ambient air is common to AB areas. The HVAC systems are designed to maintain a slight negative pressure in the AB relative to the outside. Safety devices include a high temperature device in the discharge from the fan to stop the fan and alarm in the Control Room on indication of high temperature, and a flow switch to indicate loss of air flow. The fan will stop on a high temperature signal to prevent propagation of a fire; however, it is not credited for compliance with 10 CFR 50.48. Also, the fan will stop on a high radiation signal. This system does not include safety related components but does include non-safety related components with the potential to affect safety related components.

The Fuel Handling Area Supply System is in the scope of License Renewal, because it contains:

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

FSAR and Drawing References

The Fuel Handling Area Supply System is described in CR-3 FSAR Section 9.7.2.

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

302-751-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the Fuel Handling Area Supply System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in

Table 3.3.2-6 Auxiliary Systems – Summary of Aging Management Evaluation – Fuel Handling Area Supply System.

TABLE 2.3.3-6 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: FUEL HANDLING AREA SUPPLY SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Air Handling Unit Housings	M-1 Pressure-Boundary
Ducting and components	M-1 Pressure-Boundary
Ducting closure bolting	M-1 Pressure-Boundary
Filter Housings	M-1 Pressure-Boundary
Flexible Connections	M-1 Pressure-Boundary
Fuel Handling Area Fan Housing	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.7 Decay Heat Closed Cycle Pump Cooling System

System Description

The Decay Heat (DH) Closed Cycle Pump Cooling System utilizes two 100% capacity fans and two 100% capacity cooling coils. The fans, located at the south end of the Seawater Room in the AB, draw local air through inlet filters and cooling coils, and discharge it into a common duct that directs the discharge air downward onto the DH Closed Cycle Cooling Pump motors. The safety function of the DH Closed Cycle Pump Cooling System is to cool the pump motors.

One of the redundant fans is normally inactive and is isolated by automatic control dampers. The system is operated from the Control Room. Safety devices include: (a) high temperature instruments located in the fan discharges to stop fans and alarm in the Control Room on indication of high temperature, and (b) flow switches to indicate loss of air flow. The cooling units are cooled by their respective DH Closed Cycle Cooling System. An ES actuation start signal will override the high temperature trip, the Main Control Board control switch, and a local pushbutton, until the ES actuation is reset or bypassed. Air accumulators ensure adequate air volume is available to operate required pneumatic fan dampers.

The principal components of this system are safety related. The principal accident mitigation function is to provide cooling to a secondary accident mitigation system, the DH Closed Cycle Cooling System, which in turn supports the DH Removal System operation. However, analysis has demonstrated that the fans in this system are not essential to maintaining the operability of the DH Closed Cycle Cooling System pumps.

The DH Closed Cycle Pump Cooling System is in the scope of License Renewal, because it contains:

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

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

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

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

FSAR and Drawing References

The DH Closed Cycle Pump Cooling System is described in CR-3 FSAR Section 9.7.2.

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

302-751-LR, Sheet 1

Components Subject to Aging Management Review

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

TABLE 2.3.3-7 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: DECAY HEAT CLOSED CYCLE PUMP COOLING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Air Handling Unit Housings	M-1 Pressure-Boundary
Closure bolting	M-1 Pressure-Boundary
Decay Heat Closed Cycle Pump Air Supply Fan Housings	M-1 Pressure-Boundary
Decay Heat Closed Cycle Pump Air Supply Cooling Coil Tubes	M-5 Heat Transfer
Decay Heat Closed Cycle Pump Air Supply Cooling Coil Components	M-1 Pressure-Boundary
Ducting and components	M-1 Pressure-Boundary

TABLE 2.3.3-7 (continued) COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: DECAY HEAT CLOSED CYCLE PUMP COOLING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Ducting closure bolting	M-1 Pressure-Boundary
Filter Housings	M-1 Pressure-Boundary
Flexible Connections	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary
Screens	M-2 Filtration

2.3.3.8 Spent Fuel Coolant Pump Cooling System

System Description

The Spent Fuel Coolant Pump Cooling System utilizes two 100% capacity fans and two 100% capacity cooling coils. The system supply fans draw local ambient air through inlet filters and cooling coils and discharge it into a common duct with outlets located directly above each Spent Fuel Coolant Pump motor. The fans are located outside the Spent Fuel Cooling Pump rooms on the 119 ft. elevation of the AB. The cooling units are cooled by the Nuclear Services Closed Cycle Cooling System. The safety function of the Spent Fuel Coolant Pump Cooling System is to cool the Spent Fuel Coolant Pump motors.

The system is a safety related ventilation system and consists of redundant trains, with one normally in service. Redundant fans are provided; the inactive fan is isolated by automatic control dampers. The system is operated from the Control Room. Safety devices include: (a) high temperature devices in the fan discharges to stop fans and alarm in the Control Room on indication of high temperature, and (b) flow switches to indicate loss of air flow. Air accumulators ensure adequate air volume is available to operate required pneumatic fan dampers.

The Spent Fuel Coolant Pump Cooling System is in the scope of License Renewal, because it contains:

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

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

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

FSAR and Drawing References

The Spent Fuel Coolant Pump Cooling System is described in Section 9.7.2 of the CR-3 FSAR.

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

302-751-LR, Sheet 1

Components Subject to Aging Management Review

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

TABLE 2.3.3-8 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: SPENT FUEL COOLANT PUMP COOLING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Air Handling Unit Housings	M-1 Pressure-Boundary
Closure bolting	M-1 Pressure-Boundary
Ducting and components	M-1 Pressure-Boundary
Ducting closure bolting	M-1 Pressure-Boundary
Filter Housings	M-1 Pressure-Boundary
Flexible Connections	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary
Spent Fuel Coolant Pump Air Supply Fan Housings	M-1 Pressure-Boundary
Spent Fuel Coolant Pump Air Supply Cooling Coil Tubes	M-5 Heat Transfer
Spent Fuel Coolant Pump Air Supply Cooling Coil Components	M-1 Pressure-Boundary

2.3.3.9 Spent Fuel Pit Supply System

System Description

The Spent Fuel Pit Supply System utilizes two 100% capacity fans for supplying the Spent Fuel Pit area. The fans are located in the overhead of the 143 ft. elevation of the AB. One of the two system fans provides air flow through dampers and connecting ductwork to the Spent Fuel Pools and Cask Loading Pit areas. The system includes a continuous row of supply diffusers along the south side of the pools. The air flow in the Spent Fuel Pool area captures gases released by the spent fuel and transports the gases to the AB Exhaust System which is described in Subsection 2.3.3.10. This ensures that any fission gases released are discharged through a filtered exhaust system instead of being released into the Fuel Handling Area atmosphere.

Redundant fans are provided; the inactive fan is isolated by automatic control dampers. The system is operated from the Control Room. Safety devices include a flow switch to indicate loss of air flow. During an emergency resulting in high radiation detection in the AB exhaust vent, the Spent Fuel Pit Supply Fans continue to operate.

This system does not include safety related components but does include non-safety related components with the potential to affect safety related components.

The Spent Fuel Pit Supply System is in the scope of License Renewal, because it contains:

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

FSAR and Drawing References

The Spent Fuel Pit Supply System is described in CR-3 FSAR Section 9.7.2.

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

302-751-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the Spent Fuel Pit Supply System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in

Table 3.3.2-9 Auxiliary Systems – Summary of Aging Management Evaluation – Spent Fuel Pit Supply System.

TABLE 2.3.3-9 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: SPENT FUEL PIT SUPPLY SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Ducting and components	M-1 Pressure-Boundary
Ducting closure bolting	M-1 Pressure-Boundary
Flexible Connections	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary
Spent Fuel Pit Supply Fan Housings	M-1 Pressure-Boundary

2.3.3.10 Auxiliary Building Exhaust System

System Description

The AB Exhaust System utilizes four 50% capacity fans and four 25% capacity filter plenums to exhaust air from the AB, including the Fuel Handling Area. The fans, located on the 143 ft. elevation of the AB, draw air from all AB elevations, individual enclosures, pits, rooms, areas and hoods through ductwork, dampers, and adjustable air registers. The AB ventilation exhaust duct (i.e., the plant vent) is located on the exterior wall of the RB at Buttress 5. The operational function of the system is to limit the release of radioactivity to the environment. The system does not have a safety function, is not required for the safe shutdown of the reactor, and its failure will not result in the release of large amounts of radioactivity.

The AB Supply System fans and two of the four exhaust fans from the AB Exhaust System operate continuously during normal plant operation to maintain a negative internal AB pressure relative to the outside. During an emergency resulting in high radiation detection in the AB exhaust vent, the supply fans automatically stop, but the exhaust fans continue operation. This further increases the negative internal building pressure, thus assuring no uncontrolled leakage to the outside. In the event of a fuel handling accident in which radioactivity above the radiation monitor limits is released into the AB exhaust vent, the system automatically functions in the emergency mode described above. The system is operated from the Control Room.

The system is arranged to direct air from areas of low to higher radioactivity, eventually directing it to the exhaust filters and from there through fans to the plant vent. The fuel handling area and pools are not isolated portions of the AB and the ambient air is common to all. The exhaust filters include roughing, HEPA, and charcoal cells. One of the two system fans provides air flow through dampers and connecting ductwork to the

Spent Fuel Pools and Cask Loading Pit areas. The system is not powered by the Emergency Diesel power supply. Failure of equipment is indicated by flow instrumentation located in the exhaust ducts and by an automatic trip alarm at the fan circuit breaker. If failure is indicated, a redundant unit is manually started from the Control Room or from a local station.

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

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

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

3. Components that are relied on during postulated fires.

FSAR and Drawing References

The AB Exhaust System is described in CR-3 FSAR Section 9.7.2.

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

302-752-LR, Sheet 1 302-766-LR, Sheet 1

Components Subject to Aging Management Review

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

TABLE 2.3.3-10 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: AUXILIARY BUILDING EXHAUST SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Auxiliary Building Exhaust Filter Housings	M-1 Pressure-Boundary
Auxiliary Building Fan Housings	M-1 Pressure-Boundary
Ducting and components	M-1 Pressure-Boundary

TABLE 2.3.3-10 (continued) COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: AUXILIARY BUILDING EXHAUST SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Ducting closure bolting	M-1 Pressure-Boundary
Flexible Connections	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.11 Control Complex Ventilation System

<u>System Description</u>

The Control Complex Ventilation System provides for normal and emergency modes of operation and consists of three subsystems:

1. The Normal Duty Supply subsystem which utilizes two 100% capacity supply fans, cooling coils and heaters to maintain design temperature and ventilation during normal operation,

2. The Return Air subsystem which utilizes two 100% capacity fans to maintain the design temperature during normal and emergency conditions, and

3. The Emergency Duty Supply subsystem which utilizes two 100% capacity fans and filters during emergency conditions.

Each normal duty and emergency supply and return fan is supplied ES electrical power (backed up by the Emergency Diesel Generators) such that cooling is always available. Air accumulators ensure adequate air volume is available to operate required fan dampers. This system includes a Control Complex compressed air subsystem providing control air via a receiver to air operated dampers and other ventilation equipment. Certain system components, including the Controlled Access Area Exhaust Fans, are located in the AB. The AB Exhaust System provides an exhaust path for air supplied to the Controlled Access Area. Chilled Water System chillers and pumps provide cooling to maintain the Control Complex suitable for equipment and personnel comfort during normal and emergency conditions. These chillers are supplied with cooling water from the Nuclear Services Closed Cycle Cooling System.

System safety functions are to provide cooling and maintain the vital area temperatures within design values, to provide protection for the Control Room operators during emergency conditions, and to provide ventilation for preventing the buildup of hydrogen in the Battery Rooms and Control Complex.

System operational functions include providing cooling in the non-vital areas of the building, providing fresh air and makeup air for personnel comfort for the fume hood operations in the Controlled Access Area, and providing proper ventilation in the Controlled Access Area such that airflow is in the direction of increasing radioactivity concentration. During normal operation, air is recirculated, a minimum amount of outside air is added, and ambient air is maintained at approximately 75°F.

During radiological emergency periods, the system maintains the same ambient temperature conditions but all air excluding the controlled access air is recirculated through emergency roughing, HEPA, and charcoal filters. Upon receipt of an ES Reactor Building isolation signal, system dampers automatically switch to the recirculation mode and outside air dampers close. Repositioning of these dampers establishes the boundary for the Control Complex Habitability Envelope (CCHE). The CCHE is the outer boundary of the top five floors of the Control Complex. It includes the dampers in ductwork from this area to the environment or to the lowest elevation. It is this envelope or boundary that minimizes the intake of radioactivity or toxic gas into the Control Complex and, ultimately, into the Control Room.

Upon receipt of a high radiation signal or loss of power to the normal duty fans, the emergency duty supply fans are started manually; and air flows through the Control Complex emergency charcoal filters in the recirculation mode. Upon awareness of a potential toxic gas intake, operating staff may manually switch Control Complex dampers to the recirculation positions. Provisions have been made so that varying amounts of outside air may be manually introduced at the discretion of the Control Room operators while operating in the emergency mode. Smoke detectors located in system ducts alarm in the Control Room and initiate automatic damper switching. The Control Complex Ventilation System contains safety related components that support Control Room Habitability and components that perform a post-accident monitoring function.

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

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

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

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

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

FSAR and Drawing References

The Control Complex Ventilation System is described in CR-3 FSAR Section 9.7.2.

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

302-753-LR, Sheet 1
302-753-LR, Sheet 2
302-753-LR, Sheet 3
302-753-LR, Sheet 4
302-766-LR, Sheet 1

Components Subject to Aging Management Review

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

TABLE 2.3.3-11 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CONTROL COMPLEX VENTILATION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Control Complex Emergency Fan Housings	M-1 Pressure-Boundary
Control Complex Emergency Filter Housings	M-1 Pressure-Boundary
Control Complex Normal Duty Supply Air Handling Units	M-1 Pressure-Boundary
Closure bolting	M-1 Pressure-Boundary
Control Complex Normal and Emergency Cooling Coil Tubes	M-5 Heat Transfer
Control Complex Normal and Emergency Cooling Coil Components	M-1 Pressure-Boundary
Control Complex Normal Duty Fan Housings	M-1 Pressure-Boundary
Ducting and components	M-1 Pressure-Boundary
Ducting closure bolting	M-1 Pressure-Boundary
Flexible Connections	M-1 Pressure-Boundary
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary

2.3.3.12 Emergency Diesel Generator Air Handling System

System Description

Each of the two Emergency Diesel Generator (EDG) Rooms has a separate but identical ventilation system. The system for each room consists of two 50% capacity Diesel Room cooling fans, one 100% capacity roughing filter for ventilation air, one 100% capacity filter for combustion air, one 100% capacity EDG Control Room exhaust fan, common ductwork, unit heaters and controls. The system is arranged so that the two cooling fans start automatically when the EDG starts and discharge filtered outside air into the Diesel Room for cooling. The system supplies sufficient air to maintain the room temperature no greater than 120°F. Cooling fan failure is indicated in the Main Control Room. A separate wall fan circulates air through the EDG Control Room.

The diesel combustion air intake separately supplies filtered outside air from the Fan Room to the turbocharger inlet for use as combustion and scavenging air. The EDG Air Handling System includes a products-of-combustion detector in the Diesel Room to alarm and close fire dampers, and low air flow switches to alarm in the Control Room. Fan isolation dampers open when the fan is energized and close when de-energized. The Diesel Room relief damper opens on EDG start or fan start and remains open while either is running. The Diesel Room Cooling Fans and associated HVAC control cabinets are Seismic Class I.

An end baffle and exhaust ducts are installed on each EDG to assure the exhaust air from below the generator is not recirculated back to the cooling air inlets. These also minimize generator heat rejection to adjacent electrical equipment/components and enhance the capability of this ventilation system to maintain the room temperatures within acceptable limits. The safety function of the EDG Air Handling System is to provide continuous ventilation, and dissipate internal heat gains in each EDG Room when the Diesel is operating. The system is important in accident mitigation upon the loss of offsite power sources. Failure of this system results in inoperability of the corresponding EDG.

A portion of the EDG Air Handling System is credited for cooling the Alternate AC (AAC) Diesel Generator Building. This portion of the system performs no License Renewal intended functions, because the AAC Diesel Generator is not in scope of License Renewal.

The EDG Air Handling System is in the scope of License Renewal, because it contains:

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

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

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

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

FSAR and Drawing References

The EDG Air Handling System is described in CR-3 FSAR Section 9.7.2.

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

302-754-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the EDG Air Handling System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-12 Auxiliary Systems – Summary of Aging Management Evaluation – Emergency Diesel Generator Air Handling System.

TABLE 2.3.3-12 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: EMERGENCY DIESEL GENERATOR AIR HANDLING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Ducting and components	M-1 Pressure-Boundary
Ducting closure bolting	M-1 Pressure-Boundary
EDG Air Handling Fan Housings	M-1 Pressure-Boundary
EDG Air Handling Filter Housings	M-1 Pressure-Boundary
Flexible Connections	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary
Screens	M-2 Filtration

2.3.3.13 Miscellaneous Area HVAC System

System Description

The subsystems of this system provide the ventilation requirements for several independent structures:

1. Intermediate Building,
2. Fire Pump House,
3. Dedicated Emergency Feedwater Storage Tank Enclosure,
4. Hot Machine Shop,
5. Clean Machine Shop and Cold Calibration Lab,
6. Sodium Thiosulfate Tank Area,
7. Guardhouse,
8. Personnel Hatch, and
9. Warehouse Building.

The Intermediate Building air handling subsystem fulfills the functional requirements of removing internal heat from the Intermediate Building, and maintaining the building temperature above the minimum design temperature. This subsystem includes an outside air supply utilizing one 100% capacity roughing filter, two 100% capacity supply units located at the north portion of the Intermediate Building, an exhaust subsystem utilizing two 100% capacity exhaust units located at the west portion of the Intermediate Building, ductwork and accessories. Each operating fan is isolated from the inactive fan by air operated discharge dampers. Control Room alarms for this system include: high temperature switches in the air intake and in the Intermediate Building to stop supply fans, a low temperature sensor located in the Intermediate Building, and a combustion products detector located in the Intermediate Building. Penetration room areas around portions of the Reactor Building are ventilated by this system and the AB Exhaust System.

The function of the Fire Pump House ventilation subsystem is to maintain a minimum temperature of 60°F when the supply air fans are not operating, and to eliminate heat build-up and provide combustion air when the diesel engine-powered fire pumps are operating. Equipment includes an outside air particulate filter, ductwork, isolation dampers, and fans. Isolation dampers are provided with emergency air supply tanks to open dampers in the event of a control air failure, or the system solenoid valves fail to a position allowing dampers to open. A room ionization detector sounds an alarm in the main Control Room in the event combustion products are detected. The subsystem is classified as non-safety and non-seismic.

The Dedicated Emergency Feedwater Storage Tank Enclosure air handling subsystem provides non-safety related ventilation to this space utilizing one fan, distribution ductwork and dampers drawing outside air through an insect screen. Ventilation prevents air stagnation and buildup of nitrogen.

The Hot Machine Shop air handling subsystem provides non-safety related ventilation, heating and air conditioning to this space and removes fumes and polluted air to the AB Exhaust System. The Clean Machine Shop and Cold Calibration Lab air handling subsystems provide non-safety related ventilation, cooling and heating to the various areas of these spaces. The Miscellaneous Area HVAC System also provides non-safety related ventilation, cooling, and heating to spaces in the Guardhouse and the Warehouse Building, as well as, ventilation for the Sodium Thiosulfate Tank Area.

The ventilation subsystems for the Hot Machine Shop, Clean Machine Shop and Cold Calibration Lab, Guardhouse, and Warehouse Building are not in the scope of License Renewal.

The Miscellaneous Area HVAC System is in the scope of License Renewal, because it contains:

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

2. Components that are relied on during postulated fires.

FSAR and Drawing References

The Miscellaneous Area HVAC System is described in CR-3 FSAR Section 9.7.2.

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

302-752-LR, Sheet 1 302-754-LR, Sheet 1 302-754-LR, Sheet 2

Components Subject to Aging Management Review

The table below identifies the Miscellaneous Area HVAC System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-13 Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Area HVAC System.

TABLE 2.3.3-13 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: MISCELLANEOUS AREA HVAC SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Ducting and components	M-1 Pressure-Boundary
Ducting closure bolting	M-1 Pressure-Boundary
Fan Housings	M-1 Pressure-Boundary
Fire Service Pump House Ventilation Filter Housing	M-1 Pressure-Boundary
Flexible Connections	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary
Screens	M-2 Filtration

2.3.3.14 Turbine Building Ventilation System

System Description

The Turbine Building (TB) Ventilation System functions to:

1. Provide air circulation through the TB to prevent excessive heat build-up,
2. Maintain constant temperature in the Switchgear Rooms,
3. Provide cool air in the Sample Room,
4. Exhaust hydrogen gas from the Non-vital Battery Room,
5. Supply air to the TB Instrument Calibration Room,
6. Provide cooling to the HP Break and Chemical Storage Area on the 95 ft. elevation of the TB, and
7. Stop fans and close dampers in the event of fire.

The TB Ventilation System includes supply fans in several locations, gravity roof ventilators, wall louvers, dampers and ductwork. For most TB areas, the building air temperature and humidity varies according to the outdoor temperature and humidity. The supply ventilation fans are axial flow type and are manually controlled from local stations. All supply fans include high temperature switches and Control Room annunciation. Required for fire protection, the TB Ventilation System includes fire dampers. All components of the TB Ventilation System are Seismic Class III.

For the Switchgear Rooms, a subsystem provides continuous circulation of cooled and filtered air, utilizing two 100% capacity air handling units, supply and return duct systems, and controls. Each air handling unit includes roughing filters, chilled water (supplied by separate systems) coils, and a fan section. This subsystem also supplies cooled and filtered air to the Instrument Calibration Room. Controls for the Switchgear Rooms ventilation include a room thermostat to maintain a constant temperature in each room, a high temperature switch in the common discharge plenum to stop fans and annunciate in the Control Room, and low air flow switches in the supply ducts to deenergize heating coils and annunciate in the Control Room. Smoke detectors and temperature switches in the return duct close fire dampers and annunciate in the Control Room. Air operated discharge dampers isolate inactive fans. This subsystem performs no plant safety function.

Cooling for the Sample Room, Non-vital Battery Room, Instrument Room, and the HP Break and Chemical Storage Area on the 95 ft. elevation of the TB are provided by self-contained, packaged air handling units.

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

1. Components that are relied on during postulated fires.

FSAR and Drawing References

The TB Ventilation System is described in CR-3 FSAR Section 9.7.2.

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

302-754-LR, Sheet 1 302-754-LR, Sheet 2

Components Subject to Aging Management Review

The table below identifies the TB Ventilation System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-14 Auxiliary Systems – Summary of Aging Management Evaluation – Turbine Building Ventilation System.

TABLE 2.3.3-14 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: TURBINE BUILDING VENTILATION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Ducting and components	M-1 Pressure-Boundary
Ducting closure bolting	M-1 Pressure-Boundary

2.3.3.15 Penetration Cooling System

System Description

The Penetration Cooling System provides cooling for the concrete surrounding hot or potentially hot piping that penetrates Containment. The Penetration Cooling Fans maintain an air flow in the penetration cooling coils so that the adjacent concrete temperature does not exceed 200°F.

The Penetration Cooling System consists of two fans, two cooling coils, dampers, ductwork, and associated controls. During normal operation, one Penetration Cooling Fan is in operation. When a fan is started, its associated discharge damper opens, and the discharge controller controls the cooling coil valve. The discharge controller maintains 60°F fan discharge temperature.

The Penetration Cooling Fans normally take suction from the TB airshaft, but can be aligned to Intermediate Building ventilation. Air is discharged through the cooling coils that are cooled by the Chilled Water System to ductwork that carries the cooled air to penetrations for the following systems: Main Steam, Main Feedwater, Sampling, and Decay Heat. Exhaust from the penetration enclosures is routed to the AB Exhaust System ductwork. Differential pressure instrumentation continuously monitors supply fan flow. A low flow condition is annunciated in the Main Control Room.

The fans stop on either indication of high radiation by a radiation monitor located in the AB exhaust vent or indication of high temperature in the duct upstream of a fire damper. Stopping of fans on high duct temperature allows the fire damper fusible link to break when the temperature reaches 212°F.

The Penetration Cooling Fans are controlled from the Control Room or from a local control station. In response to a high energy line break (HELB) in the Intermediate Building, the chilled water flow to the two cooling coils is automatically isolated to ensure that steam in contact with these coils does not cause excessive heat gain in the Control Complex Chilled Water System.

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

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

2. Components that are relied on during postulated fires.

FSAR and Drawing References

The Penetration Cooling System is described in CR-3 FSAR Section 9.7.2.

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

302-755-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the Penetration Cooling System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-15 Auxiliary Systems – Summary of Aging Management Evaluation – Penetration Cooling System.

TABLE 2.3.3-15 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: PENETRATION COOLING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Air Handling Unit Housings	M-1 Pressure-Boundary
Closure bolting	M-1 Pressure-Boundary
Ducting and components	M-1 Pressure-Boundary
Ducting Closure Bolting	M-1 Pressure-Boundary
Fan Housings	M-1 Pressure-Boundary
Filter Housings	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary
Reactor Building Penetration Cooling Coils	M-5 Heat Transfer
Reactor Building Penetration Cooling Coil Components	M-1 Pressure-Boundary

2.3.3.16 Emergency Feedwater Initiation and Control Room HVAC System

System Description

The Emergency Feedwater Initiation and Control (EFIC) Room HVAC System consists of two 100% capacity air handling units, containing a filter, cooling coil and fan, which are utilized during normal operation. During Appendix R conditions, the Appendix R Chilled Water System supplies cooling water to the B train cooling coil and air handling unit of the EFIC Room HVAC System. This occurs in the event that a fire renders the normal Chilled Water System inoperable. This scenario involves a fire in the Control

Room or in the HVAC Equipment Room resulting in a loss of normal ventilation and/or chilled water. The EFIC Room HVAC System is safety related.

The EFIC Room HVAC System is a separate system from those serving the balance of the Control Complex. The system includes ductwork, automatic flow control valves, instrumentation, controls, and alarms. The system was designed to meet single failure criteria and withstand seismic events. Emergency power has been furnished to ensure operation in the event of a loss of offsite power. The EFIC Room HVAC System is designed to provide cooling and maintain the environmental conditions within the four EFIC equipment rooms at approximately 78°F dry bulb temperature and 40% relative humidity.

The system runs continuously and is operated from the heating and ventilation section of the Main Control Board. One train of the redundant system is protected against the consequences of a fire. Local control stations have been provided to facilitate local operation of the air handling units. The system includes automatic isolation and flow modulating valves designed such that a failure of the control signal will allow the valves to fail in the safe position, that is, to allow full flow of chilled water to the protected air handling coil. Instrumentation and controls are provided to monitor system operation and alert the operator to abnormal conditions. Fire dampers are provided on all supply and return lines. Smoke detectors are provided in the ductwork and alarm in the Control Room.

In addition to operation from the Control Room and local stations, the protected unit can be operated from the Remote Shutdown Panel, located on the 108 ft. elevation of the Control Complex, in the event the Main Control Room is evacuated because of a fire.

For a worst case LOCA coincident with a LOOP, this system assists in maintaining room temperatures in the Control Complex habitability envelope acceptable to support the proper functioning of the safety related equipment located therein.

The EFIC Room HVAC System is in the scope of License Renewal, because it contains:

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

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

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

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

FSAR and Drawing References

The EFIC Room HVAC System is described in CR-3 FSAR Section 9.7.2.

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

302-765-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the EFIC Room HVAC System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-16 Auxiliary Systems – Summary of Aging Management Evaluation – Emergency Feedwater Initiation and Control Room HVAC System.

TABLE 2.3.3-16 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: EMERGENCY FEEDWATER INITIATION AND CONTROL ROOM HVAC SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Air Handling Unit Housings	M-1 Pressure-Boundary
Closure bolting	M-1 Pressure-Boundary
Ducting and components	M-1 Pressure-Boundary
Ducting Closure Bolting	M-1 Pressure-Boundary
EFIC Room HVAC Cooling Coil Components	M-1 Pressure-Boundary
EFIC Room HVAC Cooling Coil Tubes	M-5 Heat Transfer
EFIC Room HVAC Fan Housings	M-1 Pressure-Boundary
EFIC Room HVAC Filter Housings	M-1 Pressure-Boundary
Flexible Connections	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.17 Appendix R Control Complex Dedicated Cooling Supply System

System Description

The Appendix R Control Complex (CC) Dedicated Cooling Supply System includes only the cooling coils for 13 heat exchangers located in the CC, and one control panel located in the TB. The 13 cooling coils are located in the Division A and B Battery Charger Rooms, Division A and B 480V Switchgear Rooms, Division A and B 4160V Switchgear Rooms, Division A and B Inverter Rooms, and the Remote Shutdown Panel

Room. This system assists in providing cool air to Appendix R equipment in the CC via dedicated room cooling units.

The Appendix R Chilled Water System interfaces with the Appendix R CC Dedicated Cooling Supply System and provides cooling water to the cooling coils described above, when required. During normal plant operation, the Appendix R Chilled Water System provides chilled water to the TB switchgear room cooling coils and is isolated from the equipment in the CC. Supply and return valves to the CC cooling coils are closed during normal plant operation. The Appendix R Chilled Water System can provide 100% of the cooling for the areas listed above in the event that a fire on the 164 ft. elevation disables the normal chilled water system for the Control Complex. The fans for the 13 cooling coils described above are part of the Air Handling Ventilation and Cooling System (Refer to Subsection 2.3.3.1).

The Appendix R CC Dedicated Cooling Supply System is in the scope of License Renewal, because it contains:

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

2. Components that are relied on during postulated fires.

FSAR and Drawing References

The Appendix R CC Dedicated Cooling Supply System is described in Section 9.7.2 of the CR-3 FSAR.

The License Renewal scoping boundaries for the Appendix R CC Dedicated Cooling Supply System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

302-769-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the Appendix R CC Dedicated Cooling Supply System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-17 Auxiliary Systems – Summary of Aging Management Evaluation – Appendix R Control Complex Dedicated Cooling Supply System.

TABLE 2.3.3-17 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: APPENDIX R CONTROL COMPLEX DEDICATED COOLING SUPPLY SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Appendix R Control Complex Dedicated Room Cooler Components	M-1 Pressure-Boundary
Appendix R Control Complex Dedicated Room Cooler Tubes	M-5 Heat Transfer
Closure bolting	M-1 Pressure-Boundary

2.3.3.18 Emergency Feedwater Pump Building Ventilation System

System Description

The system provides support functions for the diesel-driven Emergency Feedwater Pump that is part of Train A of the Emergency Feedwater System by providing ventilation to the Emergency Feedwater Pump Building (EFPB). The EFPB has a Battery Room, a Tank Room, and a Diesel Pump Room.

Major equipment for the EFPB Ventilation System includes one Battery Room exhaust fan, one Tank Room exhaust fan, one Diesel Pump Room exhaust fan, separate intake filters for the Battery Room, Tank Room, and Diesel Pump Room, and ductwork, dampers, and instrumentation and controls. The three rooms are ventilated by filtering incoming air and then exhausting room air to the atmosphere.

The Battery Room is also equipped with a non-safety related heat pump to maintain the battery and battery charger temperature. The Diesel Pump Room is essentially open to the outside environment through the building intake air filter racks on the north side of the building. During operation, the engine-driven radiator cooling fan draws air through the intake filter racks and exhausts it through ductwork above the radiator to the south side of the building.

Safety related system functions include: a) maintaining the Pump Room temperature below maximum design limits when the engine is in standby, when the engine is running, and when significant residual heat is being dissipated following engine operation; b) maintaining the Battery Room atmosphere below explosive limits (i.e., preventing explosive accumulations of hydrogen gas generated by the battery charging operations); and c) providing a flow path for diesel engine exhaust out of the building while meeting engine backpressure requirements.

Operational functions of the system include: removing fuel oil fumes from the Tank Room in the event of spillage, maintaining Tank Room air quality, maintaining Battery

Room temperatures within optimal limits to prolong battery and charger life, and maintaining cleanliness in the building by filtering out external dust and insects.

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

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

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

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

FSAR and Drawing References

The EFPB Ventilation System is described in CR-3 FSAR Section 9.7.2.

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

302-754-LR, Sheet 2

Components Subject to Aging Management Review

The table below identifies the EFPB Ventilation System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-18 Auxiliary Systems – Summary of Aging Management Evaluation – Emergency Feedwater Pump Building Ventilation System.

TABLE 2.3.3-18 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: EMERGENCY FEEDWATER PUMP BUILDING VENTILATION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Ducting and components	M-1 Pressure-Boundary
Ducting Closure Bolting	M-1 Pressure-Boundary
EFP-3 Diesel Engine Exhaust; Piping, piping components, and piping elements	M-1 Pressure-Boundary
Emergency Feedwater Pump Building Ventilation Fan Housings	M-1 Pressure-Boundary

TABLE 2.3.3-18 (continued) COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: EMERGENCY FEEDWATER PUMP BUILDING VENTILATION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Emergency Feedwater Pump Building Ventilation Filter Housings	M-1 Pressure-Boundary
Expansion Joints	M-1 Pressure-Boundary
Flexible Connections	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary
Screens	M-2 Filtration

2.3.3.19 Chemical Addition System

System Description

The Chemical Addition (CA) System provides for the storage, mixing, and distribution of the required quantities of boric acid, sodium hydroxide, lithium hydroxide (LiOH) and hydrazine. The CA System is designed to add boric acid to the RCS for reactivity control, LiOH for pH control, hydrazine for oxygen control, and hydrogen peroxide during system crud reducing evolutions performed at shutdown. The system also provides boric acid for other plant components, and is sized to be able to add sufficient boric acid to maintain the reactor subcritical at any time during core life.

The CA System consists of two boric acid storage tanks, three boric acid pumps, a boric acid mix tank, an LiOH mix tank, an LiOH pump, a hydrazine pump, a caustic mix tank, a caustic pump, a boric acid control panel, chemical addition control panel, and interconnecting piping and associated valves needed by the system to perform its intended functions.

The CA System interfaces with the Core Flood and Demineralized Water Systems. The CA System provides a means of providing Boric Acid solution to the Core Flood Tanks. The Demineralized Water System provides a means of supplying demineralized water to the various CA System mix tanks and provides flushing for CA and Liquid Sampling equipment. The CA System also provides a means of supplying LiOH, boric acid solution, and hydrazine to the Make Up & Purification System.

The CA System contains components that form part of the Containment pressure boundary. These components are valves and rupture disks that protect Containment isolation components from overpressure. The system also contains components that provide a post-accident monitoring function.

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

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

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

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

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

FSAR and Drawing References

The CA System is described in CR-3 FSAR Section 9.2.

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

302-671-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the CA System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-19 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical Addition System.

TABLE 2.3.3-19 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CHEMICAL ADDITION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary

2.3.3.20 Liquid Sampling System

System Description

The Liquid Sampling System is used to take samples to assure that water qualities and boric acid concentrations are maintained. The system provides sampling capability of various tanks, pumps, the RCS, and the steam generators in order to monitor chemistry conditions. The system includes Containment isolation valves in the Liquid Sampling System piping that penetrates the RB. The system serves no safeguards function other than containment isolation following a LOCA. Redundant valves are provided to assure isolation of the RB.

The Liquid Sampling System consists of a reactor coolant and pressurizer sample cooler, two steam generator sample coolers, two sample sink/sample hood units, and the valves and equipment required for sampling fluids.

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

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

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

FSAR and Drawing References

The Liquid Sampling System is described in CR-3 FSAR Section 9.2.

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

302-672-LR, Sheet 1 302-672-LR, Sheet 2

Components Subject to Aging Management Review

The table below identifies the Liquid Sampling System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-20 Auxiliary Systems – Summary of Aging Management Evaluation – Liquid Sampling System.

TABLE 2.3.3-20 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: LIQUID SAMPLING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Piping Insulation	M-6 Thermal Insulation
Piping, piping components, and piping elements	M-1 Pressure-Boundary
Pressurizer and Steam Generator Sample Cooler Components	M-1 Pressure-Boundary
Pressurizer and Steam Generator Sample Cooler Tubes	M-5 Heat Transfer

2.3.3.21 Post Accident Liquid Sampling System

System Description

The Post Accident Liquid Sampling System is designed to obtain grab samples of reactor liquid at various sample locations for offsite analysis. Post accident atmospheric samples are provided by a separate system - the Post Accident Containment Atmospheric Sampling System (refer to Subsection 2.3.3.61).

The Post Accident Liquid Sampling System can obtain samples from the RCS letdown line, Pressurizer steam space, RCS cold legs, RB sump, and Decay Heat System coolers. Liquid samples are passed through a sample cooler, and if required a pressure reducer, to a grab sample station for collection or to a boron analyzer for boron concentration determinations.

In addition, Post Accident Liquid Sampling System instrumentation monitors containment isolation valve position. The system serves only as an ES System and is utilized during post accident conditions; thus, the system performs no normal operational function. Although the Post Accident Liquid Sampling System is not required to operate during normal plant operational modes, it is available for use if needed.

The Post Accident Liquid Sampling System is in the scope of License Renewal, because it contains:

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

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

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

FSAR and Drawing References

The Post Accident Liquid Sampling System is described in CR-3 FSAR Section 9.11.

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

302-700-LR, Sheet 1 302-700-LR, Sheet 2

Components Subject to Aging Management Review

The table below identifies the Post Accident Liquid Sampling System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-21 Auxiliary Systems – Summary of Aging Management Evaluation – Post Accident Liquid Sampling System.

TABLE 2.3.3-21 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: POST ACCIDENT LIQUID SAMPLING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure Boundary
Containment Isolation Piping and Components	M-1 Pressure Boundary
PASS Sample Cooler Components	M-1 Pressure Boundary
PASS Sample Cooler Tubes	M-5 Heat Transfer
Piping, piping components, piping elements, and tanks	M-1 Pressure Boundary

2.3.3.22 Control Complex Chilled Water System

System Description

The Control Complex Chilled Water System provides cooling water to the Control Complex Ventilation System cooling coils, RB penetration HVAC cooling coils, EFIC Room HVAC cooling coils, and the Post Accident Liquid Sampling System interface sample cooler to cool Post Accident Liquid Sampling System sample water. The heat load from the Control Complex Chilled Water System is removed by the Nuclear Services Closed Cycle Cooling System.

The system interfaces with the Appendix R Chilled Water System. Should a fire disable the main HVAC unit in the Control Complex, chilled water from the Appendix R Chilled Water System can be directed to equipment in the Control Complex.

The Control Complex Chilled Water System performs the following safety functions:

1. Provides cooling for essential Control Room ventilation equipment, and
2. Provides cooling for the EFIC Room HVAC System during all plant modes of operation excluding certain fires.

The Control Complex Chilled Water System consists of two 100% capacity chillers, two 100% capacity pumps, an expansion tank, cooling coils, and associated piping components.

The Control Complex Chilled Water System is in the scope of License Renewal, because it contains:

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

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

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

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

FSAR and Drawing References

The Control Complex Chilled Water System is described in CR-3 FSAR Section 9.7.2

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

302-756-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the Control Complex Chilled Water System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-22 Auxiliary Systems – Summary of Aging Management Evaluation – Control Complex Chilled Water System.

TABLE 2.3.3-22 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CONTROL COMPLEX CHILLED WATER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Control Complex Chilled Water Chemical Addition Tank	M-1 Pressure-Boundary
Control Complex Chilled Water Expansion Tank	M-1 Pressure-Boundary
Control Complex Chilled Water Pumps	M-1 Pressure-Boundary
Control Complex Chiller Components	M-1 Pressure-Boundary
Control Complex Chiller Condenser Tubes	M-5 Heat Transfer
Control Complex Chiller Cooler Tubes	M-5 Heat Transfer
Control Complex Chiller Lube Oil Pumps	M-1 Pressure-Boundary
Control Complex Chiller Oil Cooler Tubes	M-5 Heat Transfer
Control Complex Chiller Rupture Disk	M-1 Pressure-Boundary
Closure bolting	M-1 Pressure-Boundary
Expansion Joints	M-1 Pressure-Boundary
Piping Insulation	M-6 Thermal Insulation
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.23 Appendix R Chilled Water System

System Description

The Appendix R Chilled Water System has the capability to supply cooling water to the TB Switchgear Room air handling unit cooling coils, EFIC Room HVAC cooling coils, and miscellaneous Control Complex Appendix R HVAC loads. During normal plant operation, the system provides chilled water to the TB Switchgear Room cooling coils, and the equipment in the Control Complex is isolated. If a fire is postulated to disable the main HVAC unit in the Control Complex, the TB Switchgear Room cooling coils can be isolated with valves on the 145 ft. elevation of the TB; and flow can be directed to the equipment in the Control Complex with valves on the 119 ft. elevation of the TB.

The Appendix R Chilled Water System consists of a chiller, a chilled water pump, a chilled water surge tank, and isolation and control valves required for system operation. The system provides cooling to an EFIC Room HVAC air handling unit and to cooling coils in several rooms in the Control Complex. The Appendix R Chilled Water System is a dedicated cooling system that meets the requirements of 10 CFR 50, Appendix R, for the following areas within the Control Complex:

1. Remote Shutdown Room,
2. A and B Inverter Rooms,
3. A and B 4160V Switchgear Rooms,
4. A and B 480V Switchgear Rooms,
5. EFIC Room, and

6. A and B Battery Charger Rooms.

Unavailability of the Appendix R Chiller does not constitute a safety concern. Redundancy is not required for this system. This system is not required to be operational for planned or unplanned maintenance, as the system performs no plant safety function, and is not required to meet the single failure criteria.

The Appendix R Chilled Water System is in the scope of License Renewal, because it contains:

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

2. Components that are relied on during postulated fires.

FSAR and Drawing References

The Appendix R Chilled Water System is described in CR-3 FSAR Section 9.7.2

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

302-765-LR, Sheet 1 302-769-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the Appendix R Chilled Water System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-23 Auxiliary Systems – Summary of Aging Management Evaluation – Appendix R Chilled Water System.

TABLE 2.3.3-23 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: APPENDIX R CHILLED WATER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Appendix R Control Complex Chiller Air Cooled Condenser Components	M-1 Pressure-Boundary
Appendix R Control Complex Chiller Air Cooled Condenser Tubes	M-5 Heat Transfer
Appendix R Control Complex Chiller Cooler Components	M-1 Pressure-Boundary

TABLE 2.3.3-23 (continued) COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: APPENDIX R CHILLED WATER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Appendix R Control Complex Chiller Cooler Tubes	M-5 Heat Transfer
Appendix R Control Complex Chilled Water Pump	M-1 Pressure-Boundary
Appendix R Control Complex Chilled Water Surge Tank	M-1 Pressure-Boundary
Closure bolting	M-1 Pressure-Boundary
Expansion Joints	M-1 Pressure-Boundary
Flow restricting elements	M-1 Pressure-Boundary M-3 Throttle
Piping Insulation	M-6 Thermal Insulation
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.24 Industrial Cooling System

System Description

During normal operation, the Industrial Cooling System provides cooling or heating water to the RB Cavity Cooling System, which is part of the Air Handling Ventilation and Cooling System (refer to Subsection 2.3.3.1), and to the RB Recirculation System (refer to Subsection 2.3.3.2). The system functions in conjunction with the RB air handling systems to maintain an average RB air temperature less than the maximum limit during all phases of normal plant operation. The Industrial Cooling System also functions in conjunction with RB air handling systems to ensure no area inside the RB falls below 60°F. Also, the Industrial Cooling System is required to provide sufficient cooling water to reduce the temperature of the high pressure air discharge from the Leak Rate Test System compressors to facilitate temperature and humidity stabilization during the periodic RB Integrated Leak Rate Test (ILRT) and to ensure proper operation of the ILRT air dryer.

The Industrial Cooling System consists of two pumps, two heat exchangers, a chiller, two dual cell cooling towers and associated fans, electric heaters, recirculation pumps, and the interconnecting piping and valves required for system operation. In addition, the system contains two Reactor Cavity Cooling Coil Pumps that take suction from the Industrial Cooling supply header and discharge through isolation valves to the reactor cavity cooling units. From the cooling unit outlets, the Industrial Cooling flow is directed to the Industrial Cooling return header.

During normal operations, the Industrial Cooling System provides cooling water to the RB fan assemblies, the main fan motor coolers, and the reactor cavity cooling coils. The system consists of a main Industrial Cooling System loop and two separate heat rejection loops, the Intermediate Building (IB) Roof heat sink loop and the South Berm heat sink loop. The main Industrial Cooling loop is closed and communicates directly with the RB fan assemblies with cross-ties from the Nuclear Services closed Cycle Cooling System. The IB Roof heat sink loop is normally in operation rejecting heat to a cooling tower via either a heat exchanger – the Free Cooling Mode – or a chiller – the Mechanical Cooling Mode. The South Berm heat sink loop rejects heat to a second cooling tower to supplement the IB Roof heat sink loop. Upon an ES signal, the Industrial Cooling System supply is isolated; and the Nuclear Services Closed Cycle Cooling System is lined up to provide the emergency cooling water supply to the reactor fan assembly and main fan motor cooler for accident mitigation. During cold weather conditions, a portion of the water discharged from the running Industrial Cooling pump is manually diverted through electric heaters. From the outlet of chillers / plate heat exchanger, the majority of the Industrial Cooling system loop flow is directed to the RB. The Industrial Cooling supply header connects to Nuclear Services Closed Cycle Cooling System piping, which distributes Industrial Cooling flow to the RB main fan assembly and fan motor coolers through the associated fan assembly inlet and outlet isolation valves. Industrial Cooling water leaving the RB main fan assemblies and main fan motor coolers is directed through RB isolation valves to the return header and suction of the Industrial Cooling System recirculation pumps. The Industrial Cooling System contains components that form part of the Containment pressure boundary and components that perform a post-accident monitoring function.

A portion of the Industrial Cooling System loop flow is directed to the leak rate test air cooler and then rejoins the Industrial Cooling System main return header flow. This flowpath is maintained during normal plant operations in order to provide a pump recirculation flowpath in the event of a RB Isolation and Cooling actuation.

Demineralized water is added to the Industrial Cooling System during system initial fill. During normal operation, makeup to the system is supplied to the expansion tank. Chemicals are added to the system using a portion of the running Industrial Cooling System pump discharge flow and a chemical feed tank.

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

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

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

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

<u>FSAR and Drawing References</u>

The Industrial Cooling System is described in CR-3 FSAR Section 9.7.2.

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

302-762-LR, Sheet 1　　302-762-LR, Sheet 3

Components Subject to Aging Management Review

The table below identifies the Industrial Cooling System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-24 Auxiliary Systems – Summary of Aging Management Evaluation – Industrial Cooling System.

TABLE 2.3.3-24 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: INDUSTRIAL COOLING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Piping Insulation	M-6 Thermal Insulation
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary

2.3.3.25 Circulating Water System

System Description

The operational functions of the Circulating Water System are to provide seawater as a cooling medium to the Main Condenser and to the Secondary Services Closed Cycle Cooling Water System heat exchangers. The Circulating Water System has no safety related functions, is utilized only on non-nuclear related processes, and is not essential to the safe shutdown of the plant. The system interfaces with the Intake Canal, which is the source of water for the system, the Nuclear Service and Decay Heat Sea Water System, which shares the Circulating Water Intake Structure, and the Screen Wash Water System, which provides filtration and cleaning of the intake water. The Circulating Water System function is credited for mitigating a postulated SGTR event.

The Circulating Water System consists of four circulating water pumps, four water boxes, eight Secondary Services Closed Cycle Cooling Water System heat exchanger inlet and outlet isolation valves, and associated piping. The system includes main condenser tubing, components that have been credited in site flooding evaluations, and fire seals that are credited in Fire Protection evaluations. A portion of the Circulating Water System piping that is in scope for License Renewal consists of buried, reinforced concrete pipe. For License Renewal, the Main Condenser tubes are screened as part of the Condensate System addressed in Subsection 2.3.4.4.

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

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

2. Components that are relied on during postulated fires.

FSAR and Drawing References

The Circulating Water System is described in CR-3 FSAR Section 9.5.2.3.

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

302-201-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the Circulating Water System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-25 Auxiliary Systems – Summary of Aging Management Evaluation – Circulating Water System.

TABLE 2.3.3-25 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CIRCULATING WATER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Circulating Water Expansion Joints	M-1 Pressure-Boundary
Circulating Water Pumps	M-1 Pressure-Boundary
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary

2.3.3.26 EFP-3 Diesel Air Starting System

System Description

The Emergency Feedwater Pump No. 3 (EFP-3) Diesel Air Starting System maintains and delivers high-pressure air required to start the diesel-driven EFP-3 diesel engine. The EFP-3 diesel is started by opening redundant 125 VDC solenoid valves to direct high-pressure starting air to the air start motors to roll the engine. The solenoid valves are activated by the EFIC System.

Components required to start the EFP-3 diesel are classified as safety related. These components provide compressed air to start the EFP-3 diesel to permit the pump to perform its safety functions. While the diesel is running, the EFP-3 Diesel Air Starting System is not required to be operational. The EFP-3 Diesel Air Starting System consists of one non-safety related air compressor and two redundant trains of equipment each containing the following safety related components:

1. An air receiver,
2. Air start valve,
3. Air start solenoid valve,
4. Air start motor, and
5. Associated instrumentation.

Each set of equipment forms an independent train with capacity for six engine starts without the compressor having to start. Only one air receiver and one air start motor are required to start the engine, the other air receiver and air start motor are provided for redundancy.

The EFP-3 Diesel Air Starting System boundary within the scope of LR consists of the piping from the air compressor to the EFP-3 diesel and all the pressure retaining components such as the air receiver tanks, valves, pressure indicators, pressure switches, strainers and air start motors along the flow path - including the EFP-3 diesel. To provide indication of proper system operation, alarms are provided to alert the operators when the automatic starting air compressor control circuit is not maintaining adequate pressure or there is a problem in the system.

The EFP-3 Diesel Air Starting System is in the scope of License Renewal, because it contains:

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

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

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

FSAR and Drawing References

The EFP-3 Diesel Air Starting System is mentioned in CR-3 FSAR Section 10.5.2.

The License Renewal scoping boundaries for the EFP-3 Diesel Air Starting System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

302-778-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the EFP-3 Diesel Air Starting System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-26 Auxiliary Systems – Summary of Aging Management Evaluation – EFP-3 Diesel Air Starting System.

TABLE 2.3.3-26 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: EFP-3 DIESEL AIR STARTING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
EFP-3 Starting Air Receivers	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary
System strainers	M-1 Pressure-Boundary M-2 Filtration

2.3.3.27 Decay Heat Closed Cycle Cooling System

System Description

The Decay Heat Closed Cycle Cooling System removes decay heat released by the reactor core during cooldown following a shutdown and during refueling. The system provides for removal of decay heat by transferring heat from the Decay Heat Removal System to the Nuclear Service and Decay Heat Sea Water System. Each train is capable of providing 100% of the heat removal requirements for a normal Reactor shutdown or emergency cooling following a LOCA. The Decay Heat Closed Cycle Cooling System also provides cooling to various pumps and motors during normal operations. Owing to its closed loop design, the Decay Heat Closed Cycle Cooling

System serves as an intermediate barrier against releasing radioactive fluid to the environment. Leakage from the Decay Heat Removal System through tube leaks in the decay heat removal heat exchangers will be contained in the Decay Heat Closed Cycle Cooling System and detected by system radiation monitors and by indications of increasing Decay Heat Closed Cycle Cooling System surge tank level.

The Decay Heat Closed Cycle Cooling System consists of two independent closed loop trains. Each train contains a decay heat closed cycle cooling pump, a decay heat closed cycle heat exchanger, a surge tank, piping components associated with system heat loads, two temperature control valves, and a radiation monitor. The system contains components that provide a post-accident monitoring function.

The Decay Heat Closed Cycle Cooling System is in the scope of License Renewal, because it contains:

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

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

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

4. Components that are part of the EQ Program.

FSAR and Drawing References

The Decay Heat Closed Cycle Cooling System is described in CR-3 FSAR Section 9.5.

The License Renewal scoping boundaries for the Decay Heat Closed Cycle Cooling System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

302-631-LR, Sheet 1   302-631-LR, Sheet 2

Components Subject to Aging Management Review

The table below identifies the Decay Heat Closed Cycle Cooling System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-27 Auxiliary Systems – Summary of Aging Management Evaluation – Decay Heat Closed Cycle Cooling System.

TABLE 2.3.3-27 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: DECAY HEAT CLOSED CYCLE COOLING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Decay Heat Closed Cycle Surge Tanks	M-1 Pressure-Boundary
Decay Heat Closed Cycle Cooling Water Heat Exchanger Components	M-1 Pressure-Boundary
Decay Heat Closed Cycle Cooling Water Heat Exchanger Tubes	M-5 Heat Transfer
Decay Heat Closed Cycle Cooling Water Pumps	M-1 Pressure-Boundary
Makeup Pump Gearbox Cooler Components	M-1 Pressure-Boundary
Makeup Pump Gearbox Cooler Tubes	M-5 Heat Transfer
Makeup Pump Lube Oil Cooler Components	M-1 Pressure-Boundary
Makeup Pump Lube Oil Cooler Tubes	M-5 Heat Transfer
Motor Cooler Components	M-1 Pressure-Boundary
Motor Cooler Tubes	M-5 Heat Transfer
Piping Insulation	M-6 Thermal Insulation
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.28 Fuel Oil System

System Description

The Fuel Oil System provides diesel fuel to the Emergency Diesel Generators, the Emergency Feed Pump Diesel, and the Alternate AC diesel. However, the Alternate AC Diesel is not in the scope of License Renewal and will not be discussed further.

Emergency Diesel Generators

A major function of the Fuel Oil System is to store, maintain, and supply fuel oil for all modes of Emergency Diesel Generator (EDG) operation. Fuel Oil System components associated with each of the EDGs consist of a 30,000 gallon storage tank, a 550 gallon day tank, and pumps to transfer the fuel from the storage tank to the day tank. The fuel transfer pumps consist of a set of one AC motor-driven pump and one DC motor-driven pump for each EDG. Each pump has ample capacity to supply the day tank; the DC pump serves as the backup pump. The transfer pumps are located in the fuel oil transfer pump pits in their associated EDG radiator rooms. EDG-mounted components include filters, fuel injection pumps, and pumps to provide header pressure. These engine-mounted pumps consist of an engine-driven pump, a backup DC motor-driven pump, fuel injection pumps, and fuel injectors.

When the EDG is in operation, an engine driven fuel oil pump draws fuel oil from the day tank and delivers it to the fuel supply header through a duplex filter. Fuel injection pumps draw fuel oil from the fuel supply header and deliver it to the fuel injectors, which inject the fuel into the engine cylinders. The amount of fuel delivered to the cylinders is controlled by the fuel racks, which are positioned by the engine governor. Fuel in the fuel supply header that is not used by the engine is returned to the day tank.

The combined volume of the two 30,000 gallon underground storage tanks is sufficient to operate one diesel for a period of 7 days. The tanks are located underground outside the EDG rooms. Double valve connections exist between the two tanks to provide additional fuel capacity to either EDG. Both valves are manually operated and remain closed during normal plant operations. The fuel storage tanks are maintained in a full condition thus preventing appreciable condensation. A foot valve with an integral strainer is located inside each tank in the suction line to the fuel oil transfer pumps. Since the EDGs are vital to plant safety in the event of a loss of offsite power, the quality of the diesel fuel must meet specific standards.

Sufficient fuel is stored in each EDG 550 gallon day tank to supply the associated EDG for one hour. A double-valved connection to interconnect fuel oil Day Tanks A and B provides the capability to provide fuel from either set of Fuel Transfer Pumps A or B to either day tank. The fuel oil day tanks are located in their associated diesel engine rooms.

Emergency Feedwater Pump Diesel

The diesel fuel oil tank for EFP-3 is housed in its own room in the EFPB. The only access is through a watertight door. The fuel tank, which is anchored to the building floor, has a useable volume of 13,000 gallons. The required level in the tank is enough fuel to ensure 7 days of operation under the worst case scenario for emergency feedwater flow demands. This tank is equipped with multiple level switches and level indicators to indicate tank volumes.

For the EDGs and EFP-3, the Fuel Oil System is in the scope of License Renewal, because it contains:

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

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

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

4. Components that are part of the EQ Program.

FSAR and Drawing References

The EDG Fuel Oil System is described in CR-3 FSAR Sections 8.2.3.1.3. The EFP-3 Fuel oil system is not described in the FSAR; however information regarding the system can be found in the Bases for CR-3 ITS 3.7.19.

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

302-281-LR, Sheet 1 302-776-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the Fuel Oil System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-28 Auxiliary Systems – Summary of Aging Management Evaluation – Fuel Oil System.

TABLE 2.3.3-28 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: FUEL OIL SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Fuel Oil Filter Housings	M-1 Pressure-Boundary
Fuel Oil Pumps	M-1 Pressure-Boundary
Fuel Oil Storage Tanks	M-1 Pressure-Boundary
Fuel Oil Tanks	M-1 Pressure-Boundary
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary
System strainers	M-1 Pressure-Boundary M-2 Filtration

2.3.3.29 Jacket Coolant System

System Description

The Jacket Coolant System is divided into parts associated with the supported diesel engine: the Emergency Diesel Generators, the Emergency Feedwater Pump Diesel, and the Alternate AC diesel. The Alternate AC diesel is not in scope of License Renewal and will not be discussed further.

Emergency Diesel Generators

The Jacket Coolant System consists of the Jacket Coolant and the Air Cooler Coolant Systems. The Jacket Coolant System is a self-contained cooling system with air cooled radiators. The system is designed to remove heat from the diesel engine, lube oil coolers, and turbocharger discharge line. The main components of the Jacket Coolant System are the engine driven jacket coolant pumps, air cooled radiators, temperature control valves, coolant expansion tanks, air cooler thermostatic valves, and Standby Heater Thermostat. This system is supported by level, pressure, and temperature control instrumentation. Similarly, the Air Cooler Coolant System, also called the Intercooler Coolant System, is a self-contained cooling system with air cooled radiators that removes heat from the combustion air coolers. The main components of the Air Cooler Coolant System are the engine driven jacket coolant pumps, air cooled radiators, temperature control valves, and coolant expansion tanks. This system is supported by level, pressure, and temperature instrumentation.

The Jacket Coolant System expansion tanks are located at the top of their respective radiator compartments. The Jacket Coolant system fluid is demineralized water that contains a solution of antifreeze, corrosion inhibitor, and biocide. Cooling water pH is maintained between 9.0 and 10.5. This requirement ensures that treated cooling water does not attack non-ferrous cooling system materials.

The engine driven water pumps of the Jacket Coolant System, located on the radiator ends of their associated diesel engines, ensure that the engines are cooled at all rated loads. Temperature control valves allow fast warm-up of the engine and maintain the engine within its design temperature range. A high temperature alarm, low coolant pressure switches, and expansion tank level switches alert the operators of potential diesel generator cooling problems. Heater thermostats are provided to ensure that the minimum jacket water keep-warm temperature is maintained when the engine is in standby.

The Air Cooler Coolant System expansion tanks have an alarm to alert the operators of a low level. The Air Cooler Coolant System fluid is demineralized water that contains a solution of antifreeze, corrosion inhibitor, and biocide. Cooling water pH is maintained between 9.0 and 10.5. This requirement ensures that treated cooling water does not attack non-ferrous cooling system materials.

The engine driven water pumps of the Air Cooler Coolant System ensure that the combustion air is properly cooled to assure engine ratings are met. Temperature control valves allow fast warm-up of the combustion air cooler to avoid condensation and possible cooler damage.

Emergency Feedwater Pump Diesel

The Jacket Coolant System for the EFP-3 diesel is a self-contained cooling system with an air cooled radiator. The system is designed to remove heat from the diesel engine and lube oil. The main components of the Jacket Coolant System are heat exchangers, engine driven cooling water pump, after cooler assemblies, lube oil cooler, expansion joints, and expansion tanks.

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

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

FSAR and Drawing References

The Jacket Coolant System for the EDGs is described in CR-3 FSAR Section 8.2.3.1.3. The Air Cooler Coolant System is not described in the CR-3 FSAR; however it is shown on FSAR Figure 8-14.

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

302-283-LR, Sheet 1	302-283-LR, Sheet 2	302-284-LR, Sheet 1
302-284-LR, Sheet 2		302-777-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the Jacket Coolant System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-29 Auxiliary Systems – Summary of Aging Management Evaluation – Jacket Coolant System.

TABLE 2.3.3-29 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: JACKET COOLANT SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure Boundary
Diesel Standby Coolant Pumps	M-1 Pressure Boundary
EDG Air Cooler Coolant Radiator Components	M-1 Pressure Boundary
EDG Air Cooler Coolant Radiator Tubes	M-5 Heat transfer
EDG Combustion Air Cooler Components	M-1 Pressure Boundary
EDG Combustion Air Cooler Tubes	M-5 Heat transfer
EDG Electric Standby Heater Housing	M-1 Pressure Boundary
EDG Jacket Coolant Radiator Components	M-1 Pressure Boundary
EDG Jacket Coolant Radiator Tubes	M-5 Heat transfer
EFP-3 Aftercooler Components	M-1 Pressure Boundary
EFP-3 Aftercooler Tubes	M-5 Heat transfer
EFP-3 Gearbox Lube Oil Cooler Components	M-1 Pressure Boundary
EFP-3 Gearbox Lube Oil Cooler Tubes	M-5 Heat transfer
EFP-3 Immersion Heater Housing	M-1 Pressure Boundary
EFP-3 Lube Oil Cooler Components	M-1 Pressure Boundary
EFP-3 Lube Oil Cooler Tubes	M-5 Heat transfer
EFP-3 Radiator Components	M-1 Pressure Boundary
EFP-3 Radiator Tubes	M-5 Heat transfer
Expansion Joints	M-1 Pressure Boundary
Fan Housings	M-1 Pressure Boundary
Flow restricting elements	M-1 Pressure Boundary M-3 Throttle
Piping, piping components, piping elements, and tanks	M-1 Pressure Boundary

2.3.3.30 Diesel Generator Lube Oil System

System Description

The Diesel Generator Lube Oil System is divided into parts associated with the supported diesel engine: the Emergency Diesel Generators, the Emergency Feedwater Pump Diesel, and the Alternate AC diesel. The Alternate AC diesel is not in scope of License Renewal and will not be discussed further.

Emergency Diesel Generators

The Diesel Generator Lube Oil System provides lubrication when the EDGs are in operation and maintains lubrication under standby conditions. When an EDG is in operation, an engine-driven lube oil pump draws oil from the sump and directs the oil through a filter and temperature control valve to the lube oil cooler. The oil exiting the oil cooler is directed through a full flow strainer to the bearings, turbochargers, and other engine-driven loads. During standby conditions, oil is maintained at the required engine prestart temperature by an oil circulating pump and electric heater. Prior to every pre-planned start, the engine is prelubed using an AC motor-driven prelube pump, or a hand priming pump if the prelube pump is unavailable.

The Diesel Generator Lube Oil System includes an engine driven lube oil pump, a lube oil filter, two lube oil coolers in series, a full flow strainer, a motor driven pre-lube pump, a standby circulating pump, a 15 KW electrical heater, a thermostat, a hand priming pump, and a local pressure gauge to provide engine lubrication.

Emergency Feedwater Pump Diesel

The Diesel Generator Lube Oil System also includes lube oil components associated with the diesel-driven Emergency Feedwater Pump engine located in the EFPB. While the EFP-3 diesel engine is running, engine lubrication is provided by a combination of three separate Engine-Driven Lube Oil systems:

1. Scavenging Oil System
2. Main Lube Oil System
3. Piston Cooling System

The scavenging oil system recovers the oil from the engine sump and cools and filters it for use by the Main and Piston Cooling systems. The Main system essentially lubricates all engine parts, including the turbocharger, except for the cylinders and pistons. The piston cooling system lubricates and cools the cylinders and pistons. The Scavenging Pump takes suction from the bottom of the oil pan of the engine sump to recover oil that has drained off of the engine parts and make it available to lubricate engine parts again. AC and DC electric motor-driven pumps are provided to circulate lube oil while the engine is in standby.

A Gearbox Oil Pump provides cooled lubrication from a separate oil reservoir to the high speed gearbox components.

The Diesel Generator Lube Oil System is in the scope of License Renewal, because it contains:

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

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

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

FSAR and Drawing References

The Diesel Generator Lube Oil System for the EDGs is described in Section 8.2.3.1.3. of the CR-3 FSAR. Section 10.5.2 of the CR-3 FSAR mentions the EFP-3 Diesel Generator Lube Oil System.

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

302-285-LR, Sheet 1   302-285-LR, Sheet 2   302-775-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the Diesel Generator Lube Oil System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-30 Auxiliary Systems – Summary of Aging Management Evaluation – Diesel Generator Lube Oil System.

TABLE 2.3.3-30 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: DIESEL GENERATOR LUBE OIL SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure Boundary
EDG Lube Oil Cooler Components	M-1 Pressure Boundary
EDG Lube Oil Cooler Tubes	M-5 Heat Transfer
EDG Lube Oil Keep-Warm Electric Heater Housing	M-1 Pressure Boundary
EFP-3 Gearbox Lube Oil Reservoir	M-1 Pressure Boundary
Expansion Joints	M-1 Pressure Boundary
Piping, piping components, and piping elements	M-1 Pressure Boundary
System strainers	M-1 Pressure Boundary M-2 Filtration

2.3.3.31 Domestic Water System

System Description

Water for the Domestic Water System originates in deep wells. Untreated well water is pumped to the Units 1 & 2 water treatment facility where it is treated and conditioned to meet potable water standards. Treated water is pumped to a storage tank located at Units 1 & 2 that serves as both a head tank for distribution pumps and a supply tank to maintain a volume of water available for use. Water from the storage tank is distributed using pumps located in the Unit 1& 2 pumphouse.

The Domestic Water System supplies water to the intake area, plant buildings, and a Domestic Water Storage Tank. The Domestic Water System includes a domestic water pump, a filter, a domestic water accumulator tank, a Domestic Water Storage Tank, two flush water pumps, two domestic water filters, various valves, and piping components.

The Domestic Water System supports various functions:

1. Provides a potable water system that serves as the site drinking water supply,
2. Provides treated water to various equipment for flushing and lay-up,
3. Provides treated water for showers and eyewash,
4. Provides makeup water to the Instrument Air System Evaporative Coolers,
5. Supports normal operation of the Nuclear Services and Decay Heat Sea Water Pumps by providing backup bearing flush and cooling water, and
6. Supports normal operation of the Circulating Water Pumps by providing the normal supply of cooling water to the pump bearings.

A portion of the Domestic Water System is designed as Seismic Class I to provide an assured flow path for bearing flush and cooling water to the Nuclear Services and Decay Heat Sea Water Pumps. This pathway is aligned to provide bearing flush water from the Nuclear Services and Decay Heat Sea Water System during a loss of off-site power. In addition, the function of providing cooling to the Circulating Water Pump bearings is credited in License Renewal scoping evaluations associated with the SGTR accident.

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

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

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

<u>FSAR and Drawing References</u>

The Domestic Water System is not described in the CR-3 FSAR.

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

302-211-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the Domestic Water System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-31 Auxiliary Systems – Summary of Aging Management Evaluation – Domestic Water System.

TABLE 2.3.3-31 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: DOMESTIC WATER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure Boundary
Piping, piping components, piping elements, and tanks	M-1 Pressure Boundary
System strainer screens/elements	M-1 Pressure Boundary M-2 Filtration

2.3.3.32 Demineralized Water System

System Description

The Demineralized Water System supplies a constant source of deaerated, demineralized water to provide clean flushing and makeup water to various systems and structures:

1. Condensate System via either the Condensate Storage Tank or condenser hotwell,
2. Spent Fuel Pool Cooling System,
3. Make Up & Purification System,
4. BWST,
5. Decay Heat Closed Cycle Cooling System,
6. Nuclear Services Closed Cycle Cooling System,
7. Industrial Cooling System,
8. AB Condensate and Demineralized Water Storage Tank,
9. EFPB,
10. RB Maintenance Support Building,
11. Nuclear Service and Decay Heat Sea Water System pumps, and
12. Various systems and components inside and outside the RB.

The Demineralized Water System is not required to function during an accident, but portions of the system are required to be operational and intact to provide containment isolation upon an ES actuation signal. The system provides for Containment isolation of the system piping that penetrates the RB. The system provides a post-accident monitoring function.

The Demineralized Water System consists of a stainless steel Unit 1 & 2 Demineralized Water Storage Tank, two Demineralized Water Transfer Pumps, a water analysis system, an AB Condensate and Demineralized Water Storage Tank, two AB Demineralized Water Pumps, and interconnecting piping and valves required for system operation. The supply of demineralized water is normally from the 450,000 gallon Unit 1 & 2 Demineralized Water Storage Tank with backup from two 147,000 gallon tanks.

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

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

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

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

4. Components that are part of the EQ Program.

FSAR and Drawing References

The Demineralized Water System is not described in the CR-3 FSAR; however portions of the system are shown on FSAR Figures 9-31 and 10-6.

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

302-182-LR, Sheet 1   302-182-LR, Sheet 2   302-162-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the Demineralized Water System components/commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-32 Auxiliary Systems – Summary of Aging Management Evaluation – Demineralized Water System.

TABLE 2.3.3-32 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: DEMINERALIZED WATER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure Boundary
Containment isolation piping and components	M-1 Pressure Boundary
Flow restricting elements	M-1 Pressure Boundary M-3 Throttle
Piping, piping components, piping elements, and tanks	M-1 Pressure Boundary

2.3.3.33 Emergency Diesel Generator System

System Description

This system consists of the Emergency Diesel Generators, Alternate AC Diesel Generator, and Emergency Operations Facility Diesel Generator. However the latter two diesel generators perform no License Renewal intended function and, therefore, are not in the scope of License Renewal.

The required function of the Emergency Diesel Generator (EDG) System is to automatically provide AC electrical power to 4,160 volt Engineered Safeguards buses in order to provide motive and control power to equipment required for safe shutdown of the plant and the mitigation and control of postulated accidents following a LOOP or degraded grid voltage condition. Upon LOOP, AC power will be supplied by the two diesel engine generator units that make up the EDG System. These are sized so that either can carry the required ES load. Each EDG unit will feed one of the redundant ES 4,160 volt buses.

Each of the two independent EDGs consists of a fast start diesel engine, a generator, associated support systems, and engine and generator control and protective systems. Each of the EDGs is powered by a Fairbanks Morse 12 cylinder, 24 piston, turbocharged, blower-scavenged, two-cycle engine rated at 4,200 HP at 900 rpm. Each diesel engine is equipped with a Woodward governor to control engine speed. Each diesel generator unit consists of a diesel generator and its subsystems as described below. The subsystems are unique to their associated diesel generator to ensure that a single failure of the subsystem will not disable onsite emergency AC power:

1. Starting Air System
2. Fuel Oil System (Refer to Subsection 2.3.3.28)
3. Jacket Coolant System (Refer to Subsection 2.3.3.29)
4. Lube Oil System (Refer to Subsection 2.3.3.30)

The starting air components are included in the EDG System and the Fuel Oil, Jacket Coolant, and Lube Oil Systems are addressed as separate systems.

Redundant Starting Air System trains are provided; each train supports one EDG. A Starting Air System train consists of a dual drive air compressor with AC and DC motor drives, two air reservoirs, relief valves, check valves, and local gauges to provide starting air at 225 to 250 psi. On the EDG unit, the air is directed through a manual shutoff valve and two air start solenoid valves to the engine. Sufficient air is stored in the air reservoirs for six successive start attempts. Manual valves are provided to transfer air between the A and B starting air system trains to provide additional starting air if required. Starting air also provides control air to the HVAC control cabinets for the EDG ventilating fan controls.

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

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

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

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

4. Components that are part of the EQ Program.

FSAR and Drawing References

The EDG System is described in CR-3 FSAR Section 8.2.3.1.3.

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

302-281-LR, Sheet 1	302-282-LR, Sheet 1	302-283-LR, Sheet 1
302-283-LR, Sheet 2	302-284-LR, Sheet 1	302-284-LR, Sheet 2

Components Subject to Aging Management Review

The diesel engine is considered a complex assembly; however, the diesel engine, and coupled electric generator, are explicitly excluded from aging management in accordance with 10 CFR 54.21(a)(1)(i), as active components. Attached support systems, such as the starting air skid, fuel oil, and lube oil system, used by the diesel generator to perform its system intended functions are not considered subcomponents of the complex assembly. These supporting system components are subject to the

AMR process outside the boundary of the complex assembly at the point where the support system piping interfaces with the diesel skid.

The table below identifies the EDG System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-33 Auxiliary Systems – Summary of Aging Management Evaluation – Emergency Diesel Generator System.

TABLE 2.3.3-33 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: EMERGENCY DIESEL GENERATOR SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure Boundary
Diesel Exhaust Silencers	M-1 Pressure Boundary
EDG Starting Air Receivers	M-1 Pressure Boundary
Expansion Joints	M-1 Pressure Boundary
Piping Insulation	M-6 Thermal Insulation
Piping, piping components, piping elements, and tanks	M-1 Pressure Boundary
System strainers	M-1 Pressure Boundary M-2 Filtration

2.3.3.34 Floor Drains System

System Description

The Floor Drains System is a subsystem of the Radioactive Liquid Waste Disposal System (Refer to Subsection 2.3.3.57). Equipment drains are considered part of the Floor Drains System and are shown on the same drawings. The purpose of the Radioactive Liquid Waste Disposal System is to collect, store and process radioactive liquid wastes for reuse or disposal.

The floor drainage system provides for the safe collection, measurement, sampling, and segregation of equipment and floor drainage solutions. The following are collection points for the Floor Drains System:

1. Reactor Building Sump,
2. Auxiliary Building Sump,
3. Decay Heat Pit Sump, A,
4. Decay Heat Pit Sump, B, and
5. Laundry/Hot Shower Sump.

Each of the sumps listed above contains remote liquid level indicators and level alarms. The Floor Drains System as well as other drainage systems are credited with providing a fire protection function associated with collecting and removing fire fighting water. Components and commodities performing this function include the Floor Drains System piping in the Control Complex.

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

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

2. Components that are relied on during postulated fires.

FSAR and Drawing References

The Floor Drains System is described in CR-3 FSAR Section 11.2 and Figure 11-2.

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

302-683-LR, Sheet 1 302-683-LR, Sheet 2

Components Subject to Aging Management Review

The table below identifies the Floor Drains System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-34 Auxiliary Systems – Summary of Aging Management Evaluation – Floor Drains System.

TABLE 2.3.3-34 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: FLOOR DRAINS SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Piping, piping components, and piping elements	M-1 Pressure Boundary

2.3.3.35 Fuel Handling System

System Description

The Fuel Handling System is designed to provide a safe, effective means of transporting and handling fuel from the time it reaches CR-3 in a non-irradiated condition until it can be transferred to an onsite or offsite storage location after post-irradiation cooling. The reactor is refueled with equipment designed to handle the spent fuel assemblies underwater from the time they leave the reactor vessel until they are placed in a cask for shipment from the site. Underwater transfer of spent fuel assemblies provides an effective, economic, and transparent radiation shield, as well as a reliable cooling medium for removal of decay heat. The water is borated to assure subcriticality of the fuel during refueling. The primary components of the Fuel Handling System are:

1. Fuel Transfer Canal,
2. Fuel Transfer Tubes,
3. Spent Fuel Pool Handling Bridge Crane,
4. 120-Ton Fuel Handling Area Crane,
5. Spent Fuel Pit Missile Shield Crane,
6. Main Fuel Handling Bridge Crane,
7. Auxiliary Fuel Handling Bridge Crane,
8. New Fuel Elevator,
9. Spent and New Fuel Racks,
10. Spent Fuel Pool Gate, and
11. Various refueling tools (including the Fuel Transfer Carriages).

The Fuel Transfer Tubes are categorized as mechanical components, the remaining cranes, gates, and racks are civil/structural components and, for License Renewal, are addressed with the structure in which they are located. In addition, the two fuel transfer tubes form part of the Containment pressure boundary. Refueling tools are not permanent plant equipment and are considered outside the scope of License Renewal. The Transfer Carriage is considered to be a refueling tool.

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

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

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

FSAR and Drawing References

The Fuel Handling System is described in CR-3 FSAR Section 9.6.

There are no License Renewal scoping drawings that depict the Fuel Handling System.

Components Subject to Aging Management Review

The table below identifies the Fuel Handling System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-35 Auxiliary Systems – Summary of Aging Management Evaluation – Fuel Handling System.

TABLE 2.3.3-35 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: FUEL HANDLING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Containment isolation piping and components	M-1 Pressure Boundary

2.3.3.36 Fire Protection System

System Description

Fire Protection is accomplished through fire prevention, fire detection and suppression, and compartmentalization. Design and administrative controls ensure that fire protection features are installed and maintained to perform their intended function. Fire protection features include, but are not limited to, a fire water supply system, fire detection systems, automatic fire suppression systems (including gaseous suppression), manual fire suppression systems, and fire barriers. These installed features provide safety of both personnel and plant property.

The fire protection water originates from wells and is kept in storage tanks at Units 1 & 2. From the storage tanks, it is pumped through a main line by two pumps to the CR-3 Fire Service Water System. There are two Fire Service Water Storage Tanks containing 600,000 gallons of water dedicated to fire protection. Level monitors annunciate in the Control Room if the level drops below required limits. In the event of a large SGTR event, a Fire Service Water Storage Tank can be used for contaminated water storage if all normal storage facilities become full.

Three fire protection pumps, two diesel-driven and one electric motor-driven, each rated for 2,000 gpm at 125 psi, provide fire fighting water. A 30 gpm motor-driven jockey pump maintains a minimum pressure in the Fire Protection System under no-use conditions. The fire protection pumps are located in a pump house that is separate from other plant buildings and structures. The Fire Service Pump House and pumps are protected by a wet pipe sprinkler system. The fire protection yard main loop completely surrounds the plant and is sectionalized by post indicator valves for isolation and maintenance purposes. Each of the three fire protection pumps feeds into the main loop through isolation and check valves. Isolation valves are provided between the three points at which the pumps feed the loop so that any failure of the loop can be isolated for maintenance. Headers from the main loop, which can be isolated by post indicator valves, supply fire protection water to fixed water spray systems, sprinkler systems, and manual hose stations in the plant buildings. The fire protection water piping penetrates the RB; and, therefore, the system contains components that form part of the Containment pressure boundary.

Fire detection systems use ionization, photoelectric, thermal, and line-type thermal devices. These fire detection systems are installed to provide early warning of fire through local and remote audio and visual alarms, provide initiation signals to automatic suppression systems, and provide signals to actuate fire dampers or shut down air handling equipment.

Automatic fire suppression sub-systems include fixed water spray systems and automatic sprinkler systems. Automatic pre-action sprinkler systems are installed to protect the EDG Rooms and EFPB. A fixed, automatic, Halon 1301 fire suppression system is installed to protect the Cable Spreading Room in the Control Complex. Manual fire suppression involves the use of fire protection equipment intended for use by trained fire brigade personnel. Such equipment includes fixed water spray systems, fire extinguishers, standpipes and hose stations, fire hydrants, fire carts, and foam carts. Floor drains in several plant areas are relied on to remove fire fighting water; refer to Subsection 2.3.3.34.

Fire barriers and penetrations are utilized to create the compartmentalization element of fire protection defense-in-depth. Fire barriers take the form of fire rated walls, floors, ceilings, cable tray and conduit wraps, fire doors, fire dampers, and seals around electrical and mechanical components that pass through fire barriers. Fire Barrier Assemblies are composite structures or combinations of various components assembled to function as a fire barrier. The assemblies provide separation between fire zones or protect specific systems or components such as cable trays, electrical enclosures, and structural steel. Fire barrier assemblies may consist of material such as Thermo-lag or TSI Barriers, Mecatiss Fire Barriers, pyrocrete, ceramic fiber, Marinite, concrete/grout, or sprayed on coatings. Concrete walls, floors, and ceilings, or masonry walls that perform a fire barrier function, are addressed under the civil commodity groups associated with concrete. Concrete commodities, Fire Barrier Assemblies, Fire Barrier Penetration Seals, and Doors are civil components/commodities and are addressed with their associated structures in Section 2.4.

The Reactor Coolant Pumps are equipped with an oil collection system in accordance with 10 CFR 50, Appendix R, Section III.O. This oil collection system is part of the Reactor Coolant Pump Lube Oil Collection System. Refer to Subsection 2.3.3.39.

Two air handling fans are installed in the Fire Service Pump House to cool room temperature and to provide an adequate source of combustion air for the diesel engines when running. These fans, along with supporting dampers and emergency air reservoirs have been placed in scope for fire protection. Refer to Subsection 2.3.3.13.

Fire protection features in outside buildings not containing equipment relied on for safe shutdown of the plant are not in scope of license renewal. The boundary of components in scope for fire protection stops at the outside walls of those buildings. This includes equipment within the following structures:

- Alternate AC Diesel Building,
- Nuclear Administration Building,
- Office Building,
- Plant Administration Building,
- Reactor Building Maintenance Support Building,
- Technical Support Building, and
- Warehouses.

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

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

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

3. Components that are relied on during postulated fires.

FSAR and Drawing References

The Fire Protection System is described in CR-3 FSAR Section 9.8.7.

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

302-231-LR, Sheet 1	302-231-LR, Sheet 2	302-231-LR, Sheet 3
302-231-LR, Sheet 4	302-231-LR, Sheet 7	302-232-LR, Sheet 1

Specific components/commodities in scope for License Renewal are shown within the scoping boundaries on the above drawings and include fire hydrants, standpipes, strainer housings, pipe fittings, and valves - including deluge, post indicator, and hose reel (H. R.) isolation valves. Fire Water System pipe supports and hose stations are civil commodities and are addressed on a structure-by-structure basis in Section 2.4.

Components Subject to Aging Management Review

The table below identifies the Fire Protection System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-36 Auxiliary Systems – Summary of Aging Management Evaluation – Fire Protection System.

TABLE 2.3.3-36 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: FIRE PROTECTION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Diesel Driven Fire Pump	M-1 Pressure-Boundary
Diesel Driven Fire Pump Fuel Oil Storage Tank	M-1 Pressure-Boundary
Fan Housings	M-1 Pressure-Boundary
Fire Service Water Storage Tanks	M-1 Pressure-Boundary
Motor Driven Fire Pump	M-1 Pressure-Boundary
Piping, piping components, standpipes, hydrants, and tanks	M-1 Pressure-Boundary
Sprinkler Heads and Spray Nozzles	M-8 Spray Pattern
System strainers	M-1 Pressure-Boundary M-2 Filtration

2.3.3.37 Hydrogen Supply System

System Description

The Hydrogen Supply System functions to provide cooling to the turbine generator using the Generator Gas System, and provide a hydrogen overpressure in the Make Up & Purification System Makeup Tank (MUT) to ensure that a predetermined amount of dissolved hydrogen remains in the RCS.

The Hydrogen Supply System consists of a liquid hydrogen storage tank and the piping and valves to supply the hydrogen distribution system. The Hydrogen Supply System starts at the liquid supply tank located outside the protected area at the tank farm. Hydrogen flows from the storage tank through a vaporizer, which converts the liquid hydrogen to a gas using the heat of the surrounding air. The hydrogen gas pressure is reduced and flows through an underground pipe to the TB. The hydrogen line enters the TB for distribution and is enclosed by a guard pipe that protects the line from damage and prevents the escape of hydrogen to the atmosphere in the event of a hydrogen line leak.

Hydrogen can also be supplied from several sources: a) directly from trailer connections at the hydrogen farm when large amounts of hydrogen are required or b) from a standby header with connections for portable bottles should the need arise. System components are in the scope of License Renewal for potential spatial interactions.

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

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

FSAR and Drawing References

The Hydrogen Supply System is not described in the CR-3 FSAR; however, the system is shown on FSAR Figure 6-3 (Sheet 3).

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

302-673-LR, Sheet 3

Components Subject to Aging Management Review

The table below identifies the Hydrogen Supply System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-37 Auxiliary Systems – Summary of Aging Management Evaluation – Hydrogen Supply System.

TABLE 2.3.3-37 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: HYDROGEN SUPPLY SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure Boundary
Piping, piping components, and piping elements	M-1 Pressure Boundary

2.3.3.38 Instrument Air System

System Description

The Instrument Air System functions to:

1. Provide an adequate supply of high quality, filtered control air to various safety and non-safety related air operated valves, tanks, dampers, controls, and instrumentation,
2. Provide an adequate supply of high quality, filtered breathing air, and
3. Provide an adequate supply of high quality, filtered seal air to the inflatable hurricane barrier boots.

The system provides charging air to safety related air accumulators for air operated valves and dampers. Pneumatically operated components required for safe shutdown or RB isolation have been designed to fail in a safe position in the event of loss of the non-safety grade compressed air system. Certain components required for safe shutdown are provided with a safety grade source of backup air such that they can be stroked to their fail-safe position. The system also provides high pressure bottled air for backup operational capability of the Main Steam System Atmospheric Dump Valves to meet Station Blackout commitments.

The Instrument Air System has three electric-driven air compressors located in the TB at elevation 95 ft. Each compressor can maintain a constant discharge pressure and meet the combined air demand of the Instrument Air System and the Station Air System during normal operating conditions. A single compressor will normally be operating, and the remaining two compressors are maintained in a standby, auto start mode. This arrangement provides additional capacity if the plant air demand increases during cyclic load demands or during plant outages. Two of the air compressors receive cooling water for compressor intercoolers, aftercoolers, and oil coolers from separate dedicated evaporative cooling units located outside on the Berm. The third compressor receives cooling water from the Secondary Services Closed Cycle Cooling Water System. A heatless desiccant dryer is installed in the discharge of each compressor. The outlets of all three dryers are connected to a common header, supplying air to three receiver tanks. The outlets of the receiver tanks supply the air to the Instrument Air System distribution piping.

In addition to the three electric-driven air compressors, the Instrument Air System also has a diesel-driven air compressor located on the Berm. The diesel-driven air compressor will automatically start if the electric-driven air compressors are unable to keep the system pressure above a preset minimum value. The outlet of the diesel-driven air compressor is connected to a receiver tank to accommodate the air surges produced by the diesel compressor when operating. The outlet of the receiver tank goes to an air dryer and then goes to the Instrument Air System distribution piping.

The Instrument Air System provides dry filtered air to the Station Air System through an isolation valve. The isolation valve closes on low Instrument Air System header pressure to isolate the system from the Station Air System. With this isolation valve closed, air from 64 high pressure air bottles in the TB will be supplied to the Instrument Air System through a check valve. The air systems are not related to nuclear plant safety, with the exception of components that perform the RB isolation function.

The Instrument Air System is credited for compliance with USI A-46, "Seismic Qualification of Equipment in Operating Plants," and the majority of the system has been included in the scope of License Renewal. The system also includes a breathing air compressor station located in the Technical Support Center, which is not in the scope of License Renewal.

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

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

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

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

FSAR and Drawing References

The Instrument Air System is described in CR-3 FSAR Section 9.10.

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

302-271-LR, Sheet 1	302-271-LR, Sheet 2	302-271-LR, Sheet 4
	302-271-LR, Sheet 5	

Components Subject to Aging Management Review

The Instrument Air Compressors and subcomponents located on the compressor skids have been screened as complex assemblies for the aging management review (AMR). The table below identifies the Instrument Air System components and commodities requiring AMR and their intended functions. The AMR results for these components/ commodities are provided in Table 3.3.2-38 Auxiliary Systems – Summary of Aging Management Evaluation – Instrument Air System.

TABLE 2.3.3-38 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: INSTRUMENT AIR SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Evaporative Cooler Coils	M-5 Heat Transfer
Evaporative Cooler Components	M-1 Pressure-Boundary
Instrument Air Dryers	M-1 Pressure-Boundary
Instrument Air Receivers	M-1 Pressure-Boundary
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary
System strainers	M-1 Pressure-Boundary M-2 Filtration

2.3.3.39 Reactor Coolant Pump Lube Oil Collection System

System Description

The CR-3 Reactor Coolant Pumps (RCPs) are equipped with an oil collection system in accordance with 10 CFR 50, Appendix R, Section III.O. The RCP Lube Oil Collection System is designed, engineered, and installed such that a failure would not lead to a fire during normal operations or design basis accident conditions. The system is seismically qualified to withstand the Safe Shutdown Earthquake.

The RCP Lube Oil Collection System is capable of collecting lube oil from potential pressurized and unpressurized leakage sites on each RCP lube oil system. Leakage points protected by the oil collection system include each lift pump, mechanical joints and fittings, high pressure piping, lube oil coolers, drain lines, overflow lines and plugs, and lube oil reservoirs.

The original design oil collection system for each RCP consists of two collection basins: an upper bearing collection basin, and a lower bearing collection basin. Any leakage would be contained by these basins and drained into two closed and vented storage tanks located on the 95 ft. elevation of the RB. The vents on the storage tanks are equipped with flame arrestors. The combined storage capability of these tanks would hold the entire volume of the lube oil system of all four RCPs.

An improved RCP lube oil collection system design is being applied to replacement RCP motors to minimize potential leakage sites, improve reliability, and to improve the maintainability of the RCP Lube Oil Collection System. The seismic evaluation for the replacement RCP motor and the redesigned RCP Lube Oil Collection System included potential leakage sites, such as, drain lines, vent lines, mechanical joints in oil piping, lube oil pump, heat exchangers, and instrument connections.

The RCP Lube Oil Collection System is in the scope of License Renewal, because it contains:

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

2. Components that are relied on during postulated fires.

FSAR and Drawing References

The RCP Lube Oil Collection System is described in CR-3 FSAR Section 9.8.7.6.

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

302-292-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the RCP Lube Oil Collection System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-39 Auxiliary Systems – Summary of Aging Management Evaluation – Reactor Coolant Pump Lube Oil Collection System.

TABLE 2.3.3-39 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: REACTOR COOLANT PUMP LUBE OIL COLLECTION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary
RCP Motor Lube Oil Collection Drip Pans	M-1 Pressure-Boundary
RCP Motor Lube Oil Collection Tanks	M-1 Pressure-Boundary

2.3.3.40 Leak Rate Test System

System Description

The Leak Rate Test System safety functions include:

1. Providing containment isolation for the system piping that penetrates the RB, and
2. Providing post-accident hydrogen control capability for the RB.

Additional functions of the system include providing the capability to depressurize the RB and providing leak rate testing capability for the RB.

The Leak Rate Test System was designed to enable initial integrated leakage rate testing of the RB prior to operation and to perform subsequent integrated leakage rate tests periodically during the life of the plant. The RB pressurization portion of the system was designed to produce dry, pressurized air for use as the testing medium. The pressurized air is to be supplied by a bank of portable air compressors that are rented for each test and located in the yard outside the RB. The permanently installed part of the system is designed to accommodate installation of the air compressors.

High pressure air discharge from the compressors enters a permanently installed aftercooler, cooled by the Industrial Cooling System (Refer to Subsection 2.3.3.24), and a cyclone separator which reduces the air temperature and removes condensed moisture. The cooled air then passes through an air dryer, and a pressure reducing station before it enters the RB via an 8 in. pipe. Pressure and temperature instruments, flow meters, readout equipment, and other instrumentation required for safe and proper operation are provided.

The system is not required to operate during normal plant operations; however, the system can be utilized for routine RB depressurization.

The Leak Rate Test System is in the scope of License Renewal, because it contains:

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

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

3. Components that are part of the EQ Program.

FSAR and Drawing References

The Leak Rate Test System is described in CR-3 FSAR Section 5.6.5.

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

302-722-LR, Sheet 1 302-723-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the Leak Rate Test System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-40 Auxiliary Systems – Summary of Aging Management Evaluation – Leak Rate Test System.

TABLE 2.3.3-40 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: LEAK RATE TEST SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.41 Miscellaneous Drains System

System Description

The Miscellaneous Drains (MD) System consists of the Atmospheric Drain Tank on the 95 ft. elevation of the TB, the MD Flash Tank, and associated pumps, valves, and level instrumentation.

The MD Atmospheric Drain Tank receives liquid from the feedwater heater manual drains and feedwater side relief valves. The Nuclear Services Area Sump drains and Waste Neutralizer Tank may also be routed to the Atmospheric Drain Tank. Drain and relief liquid is routed and collected in a common header, and flows by gravity to the tank. The tank is vented to atmosphere, and drains to the TB sump.

The MD Flash Tank receives liquid from the Auxiliary Steam System and drains to the Emergency Feed Pump area sump.

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

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

2. Components that are relied on during postulated fires.

FSAR and Drawing References

The MD System is not described in the CR-3 FSAR.

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

302-114-LR, Sheet 2

Components Subject to Aging Management Review

The table below identifies the MD System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-41 Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Drains System.

TABLE 2.3.3-41 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: MISCELLANEOUS DRAINS SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary

2.3.3.42 Make Up & Purification System

System Description

The Make Up & Purification System controls the RCS inventory during all phases of normal operation, regulates boric acid concentration in the RCS, purifies the RCS, provides seal injection and return for the RCPs, provides fill water to the RCS and Core Flood Tanks, provides a means of degasification of the RCS, provides a location for sampling the RCS, and is the point of chemical addition to the RCS.

The High Pressure Injection (HPI) function of the Make Up & Purification System provides emergency core cooling to prevent uncovering the core for small RCS break sizes. Additionally, credit for boron addition from HPI is assumed in the Steam Line Break Accident Analysis. HPI / Power Operated Relief Valve Cooling (i.e., feed-and bleed cooling) provides an additional method of core cooling should SG heat transfer be inadequate. HPI is also assumed to function in the SGTR accident analysis. Make up level instrumentation in the system is credited in LR scoping evaluations with providing a means for monitoring RCS leakage.

The Make Up & Purification System consists of three letdown coolers, a pressure-reducing block orifice, a liquid radiation monitor, two prefilters, two mixed bed demineralizers, two post filters, a batch controller, a Makeup Tank, three makeup pumps and their associated lube oil pumps, two seal injection filters, two seal return coolers, and various air- and motor-operated control and isolation valves required for system operation and interface with other systems.

During normal operation of the RCS, one of three makeup pumps continuously supplies water from the Makeup Tank to the seals of each of the RCPs and to the "A" RCS cold leg. Flow to the RCP seals is automatically controlled by a total seal water flow control valve to maintain the desired flow rate to the seals. A portion of the water supplied to the pump seals enters the RCS. The remainder is returned to the Make Up & Purification System. Makeup to the RCS is automatically controlled by the Pressurizer level control valve to maintain Pressurizer level at setpoint. Makeup is used to compensate for RCS volume changes due to leakage and small RCS temperature changes. Owing to the RCP seal water which enters the RCS, a continuous letdown flow of reactor coolant is required to maintain the desired reactor coolant inventory. Letdown flow is also required for boric acid control and removal of impurities from the reactor coolant.

Components in the Make Up & Purification System form part of the RCPB and the Containment pressure boundary and perform post-accident monitoring functions.

The Make Up & Purification System is in the scope of License Renewal, because it contains:

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

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

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

4. Components that are part of the EQ Program.

<u>FSAR and Drawing References</u>

The Make Up & Purification System is described in CR-3 FSAR Section 9.1.

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

302-661-LR, Sheet 1 302-661-LR, Sheet 2 302-661-LR, Sheet 3
302-661-LR, Sheet 4

Components Subject to Aging Management Review

The table below identifies the Make Up & Purification System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-42 Auxiliary Systems – Summary of Aging Management Evaluation – Make Up & Purification System.

TABLE 2.3.3-42 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: MAKE UP & PURIFICATION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Flow restricting elements	M-1 Pressure-Boundary M-3 Throttle
HPI Pump Cyclone Separators	M-1 Pressure-Boundary M-2 Filtration
HPI Pump Lube Oil Strainer	M-1 Pressure-Boundary M-2 Filtration
HPI Pumps	M-1 Pressure-Boundary
Letdown Cooler Components	M-1 Pressure-Boundary
Letdown Cooler Tubes	M-5 Heat Transfer
Orifice (miniflow recirculation)	M-1 Pressure-Boundary M-3 Throttle
Piping Insulation	M-6 Thermal Insulation
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary
Seal Return Cooler Components	M-1 Pressure-Boundary
Seal Return Cooler Tubes	M-5 Heat Transfer

2.3.3.43 Miscellaneous Mechanical & Structures System

System Description

The Miscellaneous Mechanical & Structures System consists of various mechanical, electrical, and structural components that do not fall under a specific system designation. Structural components associated with the Miscellaneous Mechanical & Structures System have been addressed in the review of civil/structural components or commodities (Refer to Section 2.4). Electrical components within the Miscellaneous Mechanical & Structures System have been addressed in the review of electrical/I&C components or commodities (Refer to Section 2.5).

The only mechanical component associated with the Miscellaneous Mechanical & Structures System that supports a License Renewal intended function is the Plant Vent. The Plant Vent is attached to the outside of the RB at Buttress 5 (southeast) and extends from elevation 150 ft. inside the AB, through the AB roof at elevation 167.5 ft., to the top of the buttress. The remaining mechanical components in the system are either outside the scope of License Renewal based on their component quality classifications or were, in fact, civil components such as underground duct banks, shields, penetration sleeves, and access cover plates. These structural components/ commodities have been included in the License Renewal review for civil structures.

The Miscellaneous Mechanical & Structures System is in the scope of License Renewal, because it contains:

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

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

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

FSAR and Drawing References

The Miscellaneous Mechanical & Structures System is not described as a separate system in the CR-3 FSAR.

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

302-752-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the Miscellaneous Mechanical & Structures System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-43 Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Mechanical & Structures System.

TABLE 2.3.3-43 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: MISCELLANEOUS MECHANICAL & STRUCTURES SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Ducting and components	M-1 Pressure-Boundary
Ducting Closure Bolting	M-1 Pressure-Boundary

2.3.3.44 Nitrogen Supply System

System Description

The Nitrogen Supply System functions to:

1. Provide pressurized nitrogen to the Core Flood Tanks
2. Support the Containment pressure boundary by providing isolation of piping which penetrates the RB
3. Supply low-pressure nitrogen for blanketing, makeup, and pressurizing various components and systems on both the primary and secondary sides of the plant,
4. Provide a nitrogen overpressure to surge tanks in the Nuclear Services Closed Cycle Cooling System, Decay Heat Closed Cycle Cooling System, and Secondary Services Closed Cycle Cooling System,
5. Provide nitrogen for purging the MUT and the gas sampling analyzer,
6. Provide cover gas to various tanks containing liquids in the Waste Disposal System,
7. Provide cover gas to the dedicated Emergency Feedwater Tank,
8. Provide the capability to dilute the waste gas decay tanks to prevent potentially explosive mixtures,
9. Provide low pressure nitrogen to the main electrical Generator for purging purposes, and
10. Supply nitrogen to the primary chemistry lab.

The low-pressure nitrogen portion of the system consists of two 1500 gallon liquid nitrogen storage tanks located on the berm, two vaporizers, two heaters, pressure regulators, and a distribution system supplying the TB, AB, and RB.

The high-pressure nitrogen portion of the system consists of six 2,400 psig nitrogen bottles, one manifold, one heater, a portable nitrogen compressor unit, and a distribution system supplying the Core Flood Tanks. The system is capable of receiving bulk nitrogen supplied from trucks.

Nitrogen makeup to the Core Flood Tanks, while at power, is supplied from either the portable nitrogen compressor unit or six high pressure bottles. The portable nitrogen compressor unit is not connected to the system unless it is in use.

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

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

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

FSAR and Drawing References

Portions of the Nitrogen Supply System are described in Section 6.1.2.1.3 of the CR-3 FSAR; the system is depicted on FSAR Figure 6-3.

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

302-673-LR, Sheet 1 302-673-LR, Sheet 2

Components Subject to Aging Management Review

The table below identifies the Nitrogen Supply System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-44 Auxiliary Systems – Summary of Aging Management Evaluation – Nitrogen Supply System.

TABLE 2.3.3-44 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: NITROGEN SUPPLY SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.45 Penetration Cooling Auxiliary System

System Description

The Penetration Cooling Auxiliary System is a support system to the Penetration Cooling System, and consists entirely of four drain traps, two dampers, and a associated commodities. The drain traps and associated commodities provide drainage for condensate from the Penetration Cooling System cooling coils. The dampers and associated commodities distribute cooled air to the penetrations that are cooled by the Penetration Cooling System. As with the Penetration Cooling System, the Penetration Cooling Auxiliary System performs no safety related function. Penetration Cooling Auxiliary System components are located in the Intermediate Building, where the potential for spatial interaction with safety related components is assumed to exist.

The Penetration Cooling Auxiliary System is in the scope of License Renewal, because it contains:

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

FSAR and Drawing References

The Penetration Cooling Auxiliary System is not described in the CR-3 FSAR.

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

302-755-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the Penetration Cooling Auxiliary System components and commodities requiring aging management review (AMR) and their intended functions.

The AMR results for these components/commodities are provided in Table 3.3.2-45 Auxiliary Systems – Summary of Aging Management Evaluation – Penetration Cooling Auxiliary System.

TABLE 2.3.3-45 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: PENETRATION COOLING AUXILIARY SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Ducting and components	M-1 Pressure-Boundary
Ducting closure bolting	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.46 Reactor Building Airlock System

System Description

The Reactor Building Airlock System consists of two personnel airlocks and one equipment access hatch. One of the personnel airlocks is mounted in the equipment access hatch. The airlock in the equipment access hatch measures 24 ft. from door-to-door. The personnel access airlock measures 10 ft. 9 in. from door-to-door. Doors are pressure seated type for pressure within containment. The doors measure 3 ft. 6 in. by 6 ft. 8 in.

Both the equipment and personnel airlocks have flanged joints designed for the use of a double-gasketed seal. This seal has been designed to allow pressure testing between the gaskets. The personnel airlock doors are interlocked to prevent both doors being opened simultaneously. Interlocks are so connected that one door must be completely closed before the opposite door can be opened. The personnel locks have been designed, fabricated, tested, and stamped in accordance with the ASME Boiler and Pressure Vessel Code, Section III, for Class B Vessels.

The mechanical components in scope include valves and test connections and supporting piping components and tubing on the personnel locks. The hatches and locks themselves are considered to be civil/structural components in the RB structure and are addressed in Section 2.4.

The Reactor Building Airlock System is in the scope of License Renewal, because it contains:

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

FSAR and Drawing References

The Reactor Building Airlock System is described in CR-3 FSAR Section 5.2.5.2.3.

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

302-772-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the Reactor Building Airlock System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-46 Auxiliary Systems – Summary of Aging Management Evaluation – Reactor Building Airlock System.

TABLE 2.3.3-46 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: REACTOR BUILDING AIRLOCK SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.47 Roof Drains System

System Description

The Roof Drains System removes water that may pond on the roofs to ensure the roof structures are not compromised by the water load. Roof drains discharge directly into the Storm Drainage System and are designed to accommodate a rainfall intensity of 6 in. per hour. For this design capacity, no roof ponding will occur with up to a 1,000 year rainfall.

Roof drains are located above numerous safety related equipment and equipment needed for power operation. The scoping boundaries of the Roof Drains System include the piping and hangers located in the following buildings:

1. Intermediate,
2. Turbine,
3. Emergency Diesel Generator,
4. Auxiliary, and
5. Control Complex

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

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

FSAR and Drawing References

The Roof Drains System is not described in the CR-3 FSAR; however, the system is mentioned in FSAR Section 2.4.2.4.

There are no License Renewal scoping drawings that depict the Roof Drains System.

Components Subject to Aging Management Review

The table below identifies the Roof Drains System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-47 Auxiliary Systems – Summary of Aging Management Evaluation – Roof Drains System.

TABLE 2.3.3-47 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: ROOF DRAINS SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.48 Radiation Monitoring System

System Description

The Radiation Monitoring System contributes to personnel protection and equipment monitoring by measuring and recording radiation levels and concentrations of radioactivity at selected areas or in selected processes to verify compliance to governing regulations. The radiation monitoring system detects, warns, and initiates control actions when radiation levels or radionuclide concentrations exceed predetermined levels. The Radiation Monitoring System consists of the Area Gamma

Monitoring System, the Atmospheric Monitoring System, and the Liquid Monitoring System.

Twenty four gamma sensitive radiation monitors comprise the Area Gamma Monitoring System. The area radiation monitors measure the level of gamma activity adjacent to designated process components or operating areas. The area monitors provide local and Main Control Room alarms when local radiation levels exceed values that would cause personnel exposures to exceed plant radiation protection standard limits.

The Atmospheric Monitoring System is composed of 11 monitors one of which is the movable-cart type. The atmospheric radiation monitors measure the concentrations of particulate, iodine, and gaseous activity in specific areas of the plant. The atmospheric monitors provide alarms, and some monitors provide isolation/control signals to ventilation system fans and dampers, when allowable airborne activity concentrations are exceeded.

The Liquid Monitoring System consists of six liquid monitors. The liquid radiation monitors measure the concentration or rate of release of radionuclides in designated plant systems or liquid release paths. The liquid monitors provide alarms, and some monitors provide isolation control signals to process system valves, when allowable radionuclide concentrations are exceeded.

Radiation levels and alarm conditions are displayed on radiation monitoring panels located in the Control Room. A radiation monitoring recorder panel is also located in the Control Room to obtain permanent records of the radiation level and concentrations at selected locations in the plant. The system performs a post-accident monitoring function.

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

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

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

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

4. Components that are part of the EQ Program.

FSAR and Drawing References

The Radiation Monitoring System is described in CR-3 FSAR Section 11.4.

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

302-695-LR, Sheet 1 302-693-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the Radiation Monitoring System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-48 Auxiliary Systems – Summary of Aging Management Evaluation – Radiation Monitoring System.

TABLE 2.3.3-48 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: RADIATION MONITORING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.49 Nuclear Service and Decay Heat Sea Water System

System Description

The Nuclear Service and Decay Heat Sea Water System provides cooling water to the Nuclear Services Closed Cycle Cooling System heat exchangers and to the Decay Heat Closed Cycle Cooling System heat exchangers.

The functions of the Nuclear Service and Decay Heat Sea Water System are:

1. Provides cooling water to the Nuclear Services Closed Cycle Cooling System for heat removal following a design basis accident,
2. Provides cooling water to the Decay Heat Closed Cycle Cooling System for heat removal following a design basis accident,
3. Provides cooling water to the Nuclear Services Closed Cycle Cooling System for heat removal during normal plant operations,

4. Provides cooling water to the Decay Heat Closed Cycle Cooling System for decay heat removal during normal plant shutdown,
5. Provides dilution water to the Waste Disposal system effluent,
6. Recirculates heated water back to the "B" pit to maintain Nuclear Services Closed Cycle Cooling System temperatures during normal operations, and
7. Provides a post-accident monitoring function.

Cooling Water for the Nuclear Service and Decay Heat Sea Water System is taken from the Gulf of Mexico through the intake canal. Sea water drawn from the intake canal is conveyed to the sump pit by two redundant 48-inch intake conduits. One intake conduit shares a common intake structure, bar racks, and traveling screens with the Circulating Water System; while the other intake conduit is supplied with a bar rack and separate traveling screen located in a separate intake structure. The intake conduits are installed individually to one of the two compartments comprising the sump pit. A closed sluice gate separates the two compartments.

The sea water pumps, of the vertical wet-pit type, are apportioned in the sump pit as follows: one 100% capacity Normal Nuclear Services Sea Water Pump, one 100% capacity Emergency Nuclear Services Sea Water Pump, and one 100% capacity Decay Heat Service Sea Water Pump in one compartment (the "B" pit); and another group of one 100% capacity Emergency Nuclear Services Sea Water Pump and one 100% capacity Decay Heat Service Sea Water Pump in the other compartment.

Sea water is circulated through the nuclear services heat exchangers and merged with the sea water from the decay heat closed cycle heat exchangers. The combined discharge flow is routed through redundant 48-inch discharge pipes leading to the discharge canal. Three of the four nuclear service heat exchangers supply the full normal and emergency cooling requirements, with the fourth unit on reserve. Recirculation capabilities exist to warm the "B" pit during normal operations, thereby preventing the overcooling of the Nuclear Services Closed Cycle Cooling System during the cooler months. Piping expansion joints in the system are equipped with encapsulation sleeves to prevent flooding in the event of failure.

The Nuclear Service and Decay Heat Sea Water System is in the scope of License Renewal, because it contains:

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

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

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

4. Components that are part of the EQ Program.

FSAR and Drawing References

The Nuclear Service and Decay Heat Sea Water System is described in CR-3 FSAR Section 9.5.

The License Renewal scoping boundaries for the Nuclear Service and Decay Heat Sea Water System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

302-611-LR, Sheet 1 302-611-LR, Sheet 2

Components Subject to Aging Management Review

The table below identifies the Nuclear Service and Decay Heat Sea Water System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-49 Auxiliary Systems – Summary of Aging Management Evaluation – Nuclear Service and Decay Heat Sea Water System.

TABLE 2.3.3-49 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: NUCLEAR SERVICE AND DECAY HEAT SEA WATER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Cyclone Separators	M-1 Pressure-Boundary M-2 Filtration
Expansion Joints	M-1 Pressure-Boundary
Flow Restricting Orifice Housing/ Plates	M-1 Pressure-Boundary M-3 Throttle
Motor Cooler Components	M-1 Pressure-Boundary
Motor Cooler Tubes	M-5 Heat Transfer
Nuclear Service and Decay Heat Sea Water Pumps	M-1 Pressure-Boundary
Nuclear Service and Decay Heat Sea Water Pump Strainer Screens/Elements	M-1 Pressure-Boundary M-2 Filtration
Piping, piping components, and piping elements	M-1 Pressure-Boundary
Raw Water Pump Sump Sluice Gate	M-1 Pressure-Boundary

2.3.3.50 Station Air System

System Description

The Station Air System functions to:

1. Provide air for breathing,
2. Supply air to air powered equipment,
3. Provide air for testing of the RB personnel and equipment hatch seals,
4. Supply motive/control air to the Control Complex Ventilation System,
5. Provide motive power for taking samples with the Nuclear Service and Decay Heat Sea Water System sample pumps, and
6. Provide sufficient additional capacity to adequately meet outage-related demands.

The Station Air System is supplied dry filtered compressed air from the Instrument Air System. Instrument Air System air compressors, located in the TB, maintain a constant discharge pressure and meet the combined air demand of the Station Air System and the Instrument Air System during normal operating conditions. This air is provided by the Instrument Air System to the Station Air System through an isolation valve that closes on low Instrument Air System header pressure to isolate the two systems. With this isolation valve closed, air from 64 high pressure air bottles in the TB can be supplied to the Instrument Air System through a check valve. The 64 bottles each contain breathing quality air, and are manifolded together such that, under a loss of compressor scenario, a pressure control valve will provide up to 500 SCFM air for approximately 30 minutes. The pressure control manifold and high pressure bottles are located in the TB at the 95 ft. elevation.

The Station Air System also provides an independent, self-contained subsystem located in the EFPB with its own compressor. This provides compressed air for powering the building sump pump, the building fire protection supervisory system, and hose connections for pneumatic tools and related uses. The Station Air System also includes an air compressor and piping arrangement at the Intake Station for operation of pneumatic tools at the waterfront and two air compressors and piping supporting activities in the RB Maintenance Building. The system also includes two receivers that are in the scope of License Renewal. Service Air System piping penetrates the RB and includes isolation valves to ensure the capability of building isolation during accident conditions.

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

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

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

3. Components that are relied on during postulated fires.

FSAR and Drawing References

The Station Air System is described in CR-3 FSAR Section 9.10.

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

302-271-LR, Sheet 1	302-271-LR, Sheet 2	302-271-LR, Sheet 7
302-271-LR, Sheet 9		302-772-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the Station Air System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-50 Auxiliary Systems – Summary of Aging Management Evaluation – Station Air System.

TABLE 2.3.3-50 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: STATION AIR SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary
Station Air Receivers	M-1 Pressure-Boundary

2.3.3.51 Secondary Services Closed Cycle Cooling Water System

System Description

The Secondary Services Closed Cycle Cooling Water System removes heat from various components and transfers the heat to the Circulating Water System. The system is utilized only on non-nuclear related processes and is not designed to be essential to the safe shutdown of the plant. The system can also be aligned to cool an Instrument Air compressor using the Nuclear Services Closed Cycle Cooling System should the Secondary Services Closed Cycle Cooling Water System be unavailable.

This alignment has been credited as a safe shutdown flow path following a seismic event, and is included in the scope of License Renewal. The Secondary Services Closed Cycle Cooling Water System is also capable of supplying cooling water to the Control Complex chillers following a postulated Nuclear Services Closed Cycle Cooling System main header break. This has been evaluated and determined not to be a License Renewal intended function. The Secondary Services Closed Cycle Cooling Water System is assumed to be operating in support of SGTR event mitigation, and is credited with this function in License Renewal scoping evaluations.

The Secondary Services Closed Cycle Cooling Water System consists of two Secondary Services Closed Cycle Cooling Pumps, two heat exchangers, a surge tank, a booster pump, a sample pump, a chemical addition tank and pump, and piping components servicing system heat loads.

The Secondary Services Closed Cycle Cooling Water System is in the scope of License Renewal, because it contains:

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

FSAR and Drawing References

The Secondary Services Closed Cycle Cooling Water System is described in CR-3 FSAR Section 9.5.2.3.

The License Renewal scoping boundaries for the Secondary Services Closed Cycle Cooling Water System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

302-221-LR, Sheet 1 302-221-LR, Sheet 2 302-221-LR, Sheet 3

Components Subject to Aging Management Review

The table below identifies the Secondary Services Closed Cycle Cooling Water System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-51 Auxiliary Systems – Summary of Aging Management Evaluation – Secondary Services Closed Cycle Cooling Water System

TABLE 2.3.3-51 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: SECONDARY SERVICES CLOSED CYCLE COOLING WATER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Condensate Pump Motor Cooler Components	M-1 Pressure-Boundary
Condensate Pump Motor Cooler Tubes	M-5 Heat Transfer
Expansion Joints	M-1 Pressure-Boundary
Flow restricting elements	M-1 Pressure-Boundary M-3 Throttle
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary
Secondary Services Closed Cycle Booster Pump	M-1 Pressure-Boundary
Secondary Services Closed Cycle Pumps	M-1 Pressure-Boundary
Secondary Services Closed Cycle Surge Tank	M-1 Pressure-Boundary
Secondary Services Heat Exchanger Components	M-1 Pressure-Boundary
Secondary Services Heat Exchanger Tubes	M-5 Heat Transfer

2.3.3.52 Station Drains System

System Description

The Station Drains System collects liquids from various sources for disposal. The system consists of the following components:

1. The TB Sump and associated sump pumps,
2. The Chemical Storage Tank area sump and associated sump pumps,
3. The Nuclear Services area sump and associated sump pumps,
4. The Tendon Access Gallery Sump and associated sump pumps,
5. The Intake Electric Vault Sump and associated sump pump,
6. The Berm area sumps,
7. The Condensate Pit Sumps and associated sump pumps,
8. The Diesel Generator Sumps and associated sump pumps,
9. The IB EFW Pump Sump and associated sump pump,
10. The Fire Pump House Sump,
11. The EFPB sump and sump pump, and
12. The Oily Water Separator.

The liquid waste in the TB sump is removed by the Oily Water Separator and discharged to the Station Drains Tank, where it is circulated, sampled, and pumped to the selected raw water system for release to the environment.

One function of the Station Drains System is to collect the water used for suppression of fires.

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

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

2. Components that are relied on during postulated fires.

FSAR and Drawing References

The Station Drains System is not described in the CR-3 FSAR.

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

302-113-LR, Sheet 2	302-115-LR, Sheet 1	302-163-LR, Sheet 1
302-281-LR, Sheet 1	302-611-LR, Sheet 2	302-683-LR, Sheet 2

Components Subject to Aging Management Review

The table below identifies the Station Drains System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-52 Auxiliary Systems – Summary of Aging Management Evaluation – Station Drains System.

TABLE 2.3.3-52 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: STATION DRAINS SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.53 Spent Fuel Cooling System

System Description

The Spent Fuel Cooling System is designed to remove the decay heat in the stored fuel and to maintain the water clarity in the spent fuel pools. The Spent Fuel Cooling system also limits radioactive fission products released to the outside environment following a fuel assembly rupture in the spent fuel pools. In addition, it assures that irradiated fuel assemblies in the spent fuel pools do not achieve a critical state. The Spent Fuel

Cooling System provides purification of the spent fuel pool water, the fuel transfer canal water, and the contents of the BWST. It provides a means for filling the fuel transfer canal and incore instrumentation pit during refueling operations.

The Spent Fuel Cooling System consists of two spent fuel cooling pumps, two spent fuel cooling heat exchangers, a borated water recirculation pump, two filters, a demineralizer, and the interconnecting piping and valves required for system operation. The Spent Fuel Cooling System is not required to meet the single failure criteria. Redundancy in provided by having two pumps and two heat exchangers and multiple injection points into the pool. Also, the pool water thermal storage capacity affords ample time for mitigative steps to be taken following system cooling failures.

The removal of decay heat liberated by the spent fuel assemblies stored in the spent fuel pools is accomplished by continuously circulating water from the spent fuel pools through heat exchangers and back to the pools. The heat picked up from the fuel assemblies by the spent fuel system coolant is rejected to the Nuclear Services Closed Cycle Cooling System. Purification of spent fuel coolant is accomplished by directing a portion of the coolant flow through filters and demineralizers prior to returning the coolant to the pools. The system can also be aligned to fill or drain the fuel transfer canal or to recirculate and purify the water in the pools, transfer canal, or BWST. The Spent Fuel Cooling System is required to maintain sufficient spent fuel pool water level above an assumed failed fuel assembly lying on top of the spent fuel racks to afford iodine and particulate removal during a Fuel Handling Accident. In addition, the system contains components that support the Containment isolation function.

The Spent Fuel Cooling System is in the scope of License Renewal, because it contains:

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

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

3. Components that are relied on during postulated fires.

FSAR and Drawing References

The Spent Fuel Cooling System is described in CR-3 FSAR Section 9.3.

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

302-621-LR, Sheet 1 302-621-LR, Sheet 2

Components Subject to Aging Management Review

The table below identifies the Spent Fuel Cooling System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-53 Auxiliary Systems – Summary of Aging Management Evaluation – Spent Fuel Cooling System.

TABLE 2.3.3-53 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: SPENT FUEL COOLING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Demineralizer	M-1 Pressure-Boundary
Flow restricting elements	M-1 Pressure-Boundary M-3 Throttle
Piping Insulation	M-6 Thermal Insulation
Piping, piping components, and piping elements	M-1 Pressure-Boundary
Spent Fuel Cooler Components	M-1 Pressure-Boundary
Spent Fuel Cooler Tubes	M-5 Heat Transfer

2.3.3.54 Nuclear Services Closed Cycle Cooling System

System Description

The Nuclear Services Closed Cycle Cooling System removes heat from various components and transfers this heat to the Nuclear Services and Decay Heat Sea Water System. These components include the HPI Pumps, the RB fan assembly cooling coils, and the motor-driven EFW Pump. Following Engineered Safeguards actuation, the RB ventilation fan motor coolers and the RB fan assembly cooling coils (normally supplied from the Industrial Cooling System) receive their cooling water from the Nuclear Services Closed Cycle Cooling System; and some non-essential loads are isolated from the Nuclear Services Closed Cycle Cooling System. Nuclear Services Closed Cycle Cooling System is a closed loop system in order to prevent radioactive releases to the environment.

The system functions are:

1. Removes heat from various safety-related equipment and apparatus following Engineered Safeguards actuation and transfers this heat to the Nuclear Services and Decay Heat Sea Water System.

2. Prevents the release of radioactivity by acting as an intermediate barrier.
3. Removes heat from various components necessary for plant operation and transfers this heat to the Nuclear Services and Decay Heat Sea Water System.
4. Can be cross-connected to cool Secondary Services Closed Cycle Cooling Water System loads for maintenance or outage when not in plant modes 1, 2, 3, or 4.
5. Provides cooling water to the 68 Control Rod Drive Mechanism Stator Water Jacket Assembly Coolers.

The Nuclear Services Closed Cycle Cooling System contains four heat exchangers, a normal duty pump, two emergency duty pumps, two booster pumps, a surge tank, two filters, a radiation monitor, a post-accident sampling system cooler, a demineralizer, valves and piping. The Nuclear Services Closed Cycle Cooling System includes a number of safety-related valves used to align or isolate the system to selected components during accident/emergency conditions. Chemicals are added to the system using a chemical feed tank and a feed pump that injects corrosion inhibitors into the system at the Nuclear Services Closed Cycle Cooling System pump suction header.

The system contains components that support the Containment isolation function and the post-accident monitoring function.

The Nuclear Services Closed Cycle Cooling System is in the scope of License Renewal, because it contains:

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

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

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

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

<u>FSAR and Drawing References</u>

The Nuclear Services Closed Cycle Cooling System is described in Section 9.5 of the CR-3 FSAR.

The License Renewal scoping boundaries for the Nuclear Services Closed Cycle Cooling System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

302-601-LR, Sheet 1	302-601-LR, Sheet 2	302-601-LR, Sheet 3
	302-601-LR, Sheet 4	

Components Subject to Aging Management Review

The table below identifies the Nuclear Services Closed Cycle Cooling System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-54 Auxiliary Systems – Summary of Aging Management Evaluation – Nuclear Services Closed Cycle Cooling System.

TABLE 2.3.3-54 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: NUCLEAR SERVICES CLOSED CYCLE COOLING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Control Rod Drive Cooling Water Filters	M-1 Pressure-Boundary
Emergency Nuclear Services Closed Cycle Cooling (NSCCC) Pump Gearbox Lube Oil Cooler Components	M-1 Pressure-Boundary
Emergency NSCCC Pump Gearbox Lube Oil Cooler Tubes	M-5 Heat Transfer
Emergency NSCCC Pumps	M-1 Pressure-Boundary
Expansion Joints	M-1 Pressure-Boundary
Flow restricting elements	M-1 Pressure-Boundary M-3 Throttle
Normal Nuclear Services Closed Cycle Cooling Pump	M-1 Pressure-Boundary
Normal and Emergency NSCCC Pump Motor Cooler Components	M-1 Pressure-Boundary
Normal and Emergency NSCCC Pump Motor Cooler Tubes	M-5 Heat Transfer
NSCCC Heat Exchanger Components	M-1 Pressure-Boundary
NSCCC Heat Exchanger Tubes	M-5 Heat Transfer
NSCCC Booster Pumps	M-1 Pressure-Boundary
NSCCC Water Surge Tank	M-1 Pressure-Boundary
PASS NSCCC Plate Heat Exchanger	M-1 Pressure-Boundary
PASS NSCCC Plate Heat Exchanger Plates	M-5 Heat Transfer
Piping Insulation	M-6 Thermal Insulation
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary
Reactor Coolant Drain Tank Heat Exchanger Components	M-1 Pressure-Boundary
System strainers	M-1 Pressure-Boundary M-2 Filtration

2.3.3.55 Waste Disposal System

System Description

The Waste Disposal System is completely encompassed by the Radioactive Liquid Waste Disposal System (Refer to Subsection 2.3.3.57) Thus the function of the Waste Disposal System is to support the Radioactive Liquid Waste Disposal system.

The Waste Disposal System consists of the AB Sump, the Decay Heat Pit Sumps, the Deborating Demineralizers, the Spent Resin Storage Tank, various valves, and interconnecting piping and instrumentation required for the system operation.

The Waste Disposal System is not required to function during an emergency condition. However, portions of the system are required to be operational and intact to provide Containment isolation upon an ES actuation signal. The system contains components that support the post-accident monitoring function. In addition, the Waste Disposal System is credited with providing a fire protection function associated with draining fire fighting water from plant areas.

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

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

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

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

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

FSAR and Drawing References

The Waste Disposal System is not described in the CR-3 FSAR.

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

302-681-LR, Sheet 1	302-681-LR, Sheet 2	302-681-LR, Sheet 3
302-681-LR, Sheet 4		302-681-LR, Sheet 5

Components Subject to Aging Management Review

The table below identifies the Waste Disposal System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-55 Auxiliary Systems – Summary of Aging Management Evaluation – Waste Disposal System.

TABLE 2.3.3-55 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: WASTE DISPOSAL SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary

2.3.3.56 Radioactive Gas Waste Disposal System

System Description

The Radioactive Gas Waste Disposal System safely collects, stores, monitors, and releases gases evolved from the primary coolant and Radioactive Liquid Waste Disposal Systems. The mixture of gasses collected (nitrogen, hydrogen, and radioactive gaseous isotopes) is compressed and stored to allow decay of its radioactive components prior to recycling or disposal through the AB vent stack to the atmosphere.

The Radioactive Gas Waste Disposal System consists of two gas compressors, three Waste Gas Decay Tanks, a waste gas decay tank sequencer, a waste sampling system, and the interconnecting piping, control valves, and instrumentation required for system operation.

The Radioactive Gas Waste Disposal System functions include:

1. A means for compressing gases contained above the liquids in the Radioactive Liquid Waste and Reactor Coolant Systems,
2. Capability for recycling and reuse of collected gases from the Waste Gas Decay Tanks,
3. Storage for the decay of radioactive gases that exceed disposal limits, and
4. A means for controlled release and monitoring of radioactive gases to the environment.

In addition, the system minimizes corrosion of storage tanks and prevents explosive gas mixtures from developing by maintaining a nitrogen blanket in the tanks. The system is capable of storing the potentially large volume of gases generated by an accident.

The Radioactive Gas Waste Disposal System is not required to function during an emergency condition; however, the system is required for the control of radioactive gas releases to the environment, and to permit the venting of excess gas to the RB in a post accident situation. Portions of the system are required to be operational and intact to provide Containment isolation upon an ES actuation signal. Based on the CLB, the Waste Gas Decay Tanks perform no intended functions for License Renewal; therefore, these tanks are not in scope.

The Radioactive Gas Waste Disposal System is in the scope of License Renewal, because it contains:

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

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

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

FSAR and Drawing References

The Radioactive Gas Waste Disposal System is described in Section 11.2.2 of the CR-3 FSAR.

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

302-691-LR, Sheet 1 302-691-LR, Sheet 2

Components Subject to Aging Management Review

The Waste Gas Compressors and attached subcomponents on the compressor skids have been screened as complex assemblies for the aging management review (AMR). The table below identifies the Radioactive Gas Waste Disposal System components and commodities requiring AMR and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-56 Auxiliary Systems – Summary of Aging Management Evaluation – Radioactive Gas Waste Disposal System.

TABLE 2.3.3-56 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: RADIOACTIVE GAS WASTE DISPOSAL SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and Components	M-1 Pressure-Boundary
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary

2.3.3.57 Radioactive Liquid Waste Disposal System

System Description

The Radioactive Liquid Waste Disposal System provides a means to process radioactive liquid waste prior to release and ensures that waste releases are performed in a controlled manner. The Radioactive Liquid Waste Disposal System is required to collect, store and process radioactive liquid waste for disposal or reuse. The control of radioactive effluents released to the environment is a required operational function. The Radioactive Liquid Waste Disposal System supports this function by collecting, processing, and storing similar types of waste together to permit desired segregation of waste having dissimilar chemical composition, activity, or degree of cleanliness. The Radioactive Liquid Waste Disposal System equipment is divided into the reactor coolant and miscellaneous waste processing trains.

The reactor coolant processing train consists of the Reactor Coolant Drain Tank, three Reactor Coolant Bleed Tanks, two cation demineralizers, and the pumps, valves, and interconnecting piping required for system operation. The primary processing train is used to collect, store, and process high purity waste such as reactor coolant and refueling water. The primary processing train supports chemical shim of the reactor and RCS volume control.

The miscellaneous waste processing train consists of the Miscellaneous Waste Storage Tank, the RB Sump, two Evaporator Condensate Storage Tanks, two Concentrated Boric Acid Storage Tanks, two Concentrated Waste Storage Tanks, a neutralizer tank, the Laundry/ Hot Shower sump, the Laundry And Hot Shower Monitoring Tanks, the Radwaste Demineralizers, and the valves, pumps and interconnecting piping required for system operation. The miscellaneous waste processing train is used to process wastes from the RB and AB floor drains and sumps, radioactive laboratory drains, equipment drains, and demineralized water used for sluices to the Spent Resin Storage Tank. The contents of the laundry and hot shower monitoring tanks and the waste water stored in the Evaporator Condensate Storage Tanks, after processing through the Radwaste Demineralizers, are released to the environment through the raw water system. Liquid not meeting the release requirements must be returned to the appropriate processing train and reprocessed. The RB Sump is considered to be a civil/structural commodity for License Renewal.

The waste drumming part of the system is designed to allow for the collection, retention and packaging of concentrated liquid waste and spent resin for offsite disposal. It consists of valves and interconnecting piping for system operation.

The Radioactive Liquid Waste Disposal System is not required to function during an emergency condition; however, portions of the system are required to be operational and intact to provide Containment isolation upon an ES actuation signal. Components in the system perform a post-accident monitoring function.

The Radioactive Liquid Waste Disposal System is in the scope of License Renewal, because it contains:

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

FSAR and Drawing References

The Radioactive Liquid Waste Disposal System is described in Section 11.2.1 of the CR-3 FSAR.

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

302-681-LR, Sheet 1	302-681-LR, Sheet 2	302-681-LR, Sheet 3
302-681-LR, Sheet 4	302-681-LR, Sheet 5	302-682-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the Radioactive Liquid Waste Disposal System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-57 Auxiliary Systems – Summary of Aging Management Evaluation – Radioactive Liquid Waste Disposal System.

TABLE 2.3.3-57 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Piping Insulation	M-6 Thermal Insulation
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary
Reactor Coolant Drain Tank	M-1 Pressure-Boundary

2.3.3.58 Reactor Coolant and Miscellaneous Waste Evaporator System

<u>System Description</u>

The Reactor Coolant and Miscellaneous Waste Evaporator System has been abandoned in place. The system consists of piping, valves, pumps, tanks, heat exchangers, evaporators and various instrumentation components. The abandoned components are located in the AB which is a safety related structure. Although abandoned in place, components in the system are conservatively considered to have the potential to cause spatial interactions with safety related equipment. These components and associated piping have been brought into scope for 10 CFR 54.4(a)(2). Therefore, the system has been brought into the scope of License Renewal.

The Reactor Coolant and Miscellaneous Waste Evaporator System is in the scope of License Renewal, because it contains:

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

<u>FSAR and Drawing References</u>

The Reactor Coolant and Miscellaneous Waste Evaporator System is not described in the CR-3 FSAR; however, the introduction to FSAR Section 11.2 confirms that the system has been abandoned.

The License Renewal scoping boundaries for the Reactor Coolant and Miscellaneous Waste Evaporator System are not shown on any scoping drawings.

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

The table below identifies the Reactor Coolant and Miscellaneous Waste Evaporator System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/ commodities are provided in Table 3.3.2-58 Auxiliary Systems – Summary of Aging Management Evaluation – Reactor Coolant and Miscellaneous Waste Evaporator System.

TABLE 2.3.3-58 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: REACTOR COOLANT AND MISCELLANEOUS WASTE EVAPORATOR SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.59 Waste Gas Sampling System

System Description

The Waste Gas Sampling System monitors the Waste Gas Decay Tanks (WGDTs) and other tanks and volumes for explosive gas mixtures by analyzing the hydrogen and oxygen concentrations. The in-service WGDT is normally sampled continuously. A sample bomb can be used for obtaining pressurized samples for other analyses. The sample bomb can be connected to the various sample points supplying the gas sampling analyzer. Nitrogen is provided to each tank to maintain the levels below the flammability limit for hydrogen and oxygen.

The Waste Gas Sampling System consists of oxygen and hydrogen analyzers, a waste gas sampling pump, sample cooler, a programmable controller, and associated piping, valves, and instrumentation.

The Waste Gas Sampling System is in the scope of License Renewal, because it contains:

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

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

FSAR and Drawing References

The Waste Gas Sampling System is described in CR-3 FSAR Section 11.2.2.

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

302-692-LR, Sheet 1

Components Subject to Aging Management Review

Note that the Waste Gas Analyzer Cabinet and internal components have been screened as a complex assembly for the aging management review (AMR). The table below identifies the Waste Gas Sampling System components and commodities requiring AMR and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-59 Auxiliary Systems – Summary of Aging Management Evaluation – Waste Gas Sampling System.

TABLE 2.3.3-59 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: WASTE GAS SAMPLING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.60 Waste Sampling System

System Description

The Waste Sampling System is completely encompassed by the Post Accident Containment Atmospheric Sampling System (Refer to Subsection 2.3.3.61); and thus, it is considered to be a part of that system. The function of the Waste Sampling System is to support the Post Accident Containment Atmospheric Sampling System; therefore, it performs a post-accident monitoring function.

The Waste Sampling System consists of two hydrogen analyzer line moisture separators, a moisture separator drain tank, gas monitors, various valves, and piping and instrumentation required for system operation. The Waste Sampling System also supports the Containment pressure boundary function.

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

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

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

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

FSAR and Drawing References

The Waste Sampling System is not described in the CR-3 FSAR; refer to the discussion of post accident containment atmospheric sampling in Subsection 2.3.3.61.

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

302-693-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the Waste Sampling System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-60 Auxiliary Systems – Summary of Aging Management Evaluation – Waste Sampling System.

TABLE 2.3.3-60 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: WASTE SAMPLING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary

2.3.3.61 Post Accident Containment Atmospheric Sampling System

System Description

The Post Accident Sampling System consists of: the Post Accident Liquid Sampling System (Refer to Subsection 2.3.3.21) and the Post Accident Containment Atmospheric Sampling System. The Post Accident Containment Atmospheric Sampling System provides long term information to determine the types and quantities of gases and fission products released to the RB atmosphere.

The sample delivery portion of the system consists of three possible sample points within the RB. Two of these sample points are shared by the Hydrogen Monitoring System and the other is used by one of the existing RB radiation monitors. The sample is returned to the RB through a return penetration. The system is designed to provide a means of obtaining grab samples of various atmospheric effluents from the following sources; RB atmosphere, RB purge exhaust duct, and AB exhaust duct. Grab samples are collected and sent offsite for analysis.

The RB Atmosphere and Noble Gas Effluent Monitoring subsystem consists of two loops with one equipment train per loop. The design features identical RB and AB vent manifolds. Each manifold contains two high range particulate and iodine filters, a mid range noble gas monitor, a high range noble gas monitor, sample line solenoid valves, and a low-medium-high valve controller. The two high range particulate and iodine filters use silver zeolite rather than activated charcoal. This enables them to collect higher concentrations of particulates and iodides. The low pressure manifold is used for isotopic analysis of the air in the RB vent duct and in the combined vent duct from the AB and fuel handling area.

The Post Accident Containment Atmospheric Sampling System provides containment isolation in the piping/tubing that penetrate the RB. Instrumentation in the system provides monitoring of post-accident containment isolation valve position.

The Post Accident Containment Atmospheric Sampling System is utilized during post accident conditions, thus the system performs no normal operational function. Although the Post Accident Containment Atmospheric Sampling System is not required to operate during normal plant operational modes, it is available for use if needed.

The Post Accident Containment Atmospheric Sampling System is in the scope of License Renewal, because it contains:

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

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

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

<u>FSAR and Drawing References</u>

The Post Accident Containment Atmospheric Sampling System is described in CR-3 FSAR Section 9.11.

The License Renewal scoping boundaries for the Post Accident Containment Atmospheric Sampling System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

302-693-LR, Sheet 1 302-694-LR, Sheet 1 302-695-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the Post Accident Containment Atmospheric Sampling System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-61 Auxiliary Systems – Summary of Aging Management Evaluation – Post Accident Containment Atmospheric Sampling System.

TABLE 2.3.3-61 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: POST ACCIDENT CONTAINMENT ATMOSPHERIC SAMPLING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.4 STEAM AND POWER CONVERSION SYSTEMS

The following systems are included in this Subsection:

1. Condenser Air Removal System (Subsection 2.3.4.1)
2. Auxiliary Steam System (Subsection 2.3.4.2)
3. Condensate Chemical Treatment System (Subsection 2.3.4.3)
4. Condensate System (Subsection 2.3.4.4)
5. OTSG Chemical Cleaning System (Subsection 2.3.4.5)
6. Condensate and Feedwater (CD & FW) Chemical Cleaning System (Subsection 2.3.4.6)
7. Condensate Demineralizer System (Subsection 2.3.4.7)
8. Emergency Feedwater System (Subsection 2.3.4.8)
9. Electro-Hydraulic Control System (Subsection 2.3.4.9)
10. Main Feedwater System (Subsection 2.3.4.10)
11. Gland Steam System (Subsection 2.3.4.11)
12. Gland Seal Water System (Subsection 2.3.4.12)
13. Heater Drains System (Subsection 2.3.4.13)
14. Heater Vents System (Subsection 2.3.4.14)
15. Main Feedwater Turbine Lube Oil System (Subsection 2.3.4.15)
16. Main Steam System (Subsection 2.3.4.16)
17. Relief Valve Vent System (Subsection 2.3.4.17)
18. Secondary Plant System (Subsection 2.3.4.18)
19. Cycle Startup System (Subsection 2.3.4.19)
20. Turbine Generator System (Subsection 2.3.4.20)

2.3.4.1 Condenser Air Removal System

System Description

The Condenser Air Removal System has no safety related functions. The system operates to:

1. establish and maintain a vacuum in the main condenser by removing non-condensible gases,
2. provide a means of measuring the air in-leakage to the main condenser, and
3. provide a means of monitoring for steam generator tube leaks.

The Condenser Air Removal System is assumed necessary for the satisfactory operation of the main condenser during recovery from an SGTR accident.

The Condenser Air Removal System consists of two air removal pumps, two seal water pumps, associated pneumatic valves, four manual condenser air removal valves, and a radiation monitor. Air removal is accomplished through two modes of vacuum pump operation; low/high vacuum operation, or the hogging mode, and the holding mode. The amount of condenser vacuum determines which mode of operation is required. The system is designed to automatically position valves to shift between modes of operation and to auto-start the standby pump if required.

Measurement of air leakage into the main condenser is accomplished by diverting the flow of non-condensible gases from the normal discharge path through a rotometer. Should the rate of in-leakage increase to an unacceptable value, the source(s) of additional leakage will be determined and corrected.

The Condenser Air Removal System has piping and associated components installed in the AB where the potential for adverse spatial interaction is assumed to exist. Additionally, the system includes valves associated with the Main Condenser that are classified as required subsequent to an earthquake.

The Condenser Air Removal System is in the scope of License Renewal, because it contains:

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

FSAR and Drawing References

The Condenser Air Removal System is not described in the CR-3 FSAR. The radiation monitor associated with this system is discussed in FSAR Section 11.2.3.3.

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

302-131-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the Condenser Air Removal System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-1 Auxiliary Systems – Summary of Aging Management Evaluation – Condenser Air Removal System.

TABLE 2.3.4-1 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CONDENSER AIR REMOVAL SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure Boundary
Condenser Vacuum Pump Heat Exchanger	M-1 Pressure Boundary
Condenser Vacuum Pump Heat Exchanger Heat Transfer Surfaces	M-5 Heat Transfer
Piping, piping components, piping elements, and tanks	M-1 Pressure Boundary

2.3.4.2 Auxiliary Steam System

System Description

During startup and shutdown operation, when reactor power is less than 10% power, Unit 1 or 2 normally supplies the Auxiliary Steam System from the high pressure turbine exhaust of the selected operating unit. The amount of steam available is dependent upon the current load on the selected turbine. Once the reactor is above 10%, the Main Steam System normally supplies auxiliary steam to system loads. Low pressure steam to the main feedwater pumps is supplied from the Auxiliary Steam System until the plant reaches approximately 80% power. Above 80%, the low pressure steam to the main feedwater pumps is supplied from reheat steam. The Auxiliary Steam System provides a pathway for steam between the Main Steam System and the Turbine-Driven EFW Pump.

Portions of the Auxiliary Steam System are required to operate during a postulated SBO event to bring the plant to safe shutdown condition by providing steam to the EFW Pump turbine for emergency cooling. In addition, the Auxiliary Steam System is necessary for the satisfactory operation of the MF Pump and isolation of portions of the Gland Seal Water System during recovery from a SGTR accident.

The Auxiliary Steam System consists of connecting piping from the main steam lines and fossil units CR-1 and CR-2 to the system loads, system pressure regulating, control and isolation valves and a desuperheater. Steam drain traps connected to the low points in the system collect moisture and route it to the condenser or a flash tank.

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

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

FSAR and Drawing References

The Auxiliary Steam System is described in CR-3 FSAR Section 10.2.3.

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

302-051-LR, Sheet 1 302-114-LR, Sheet 2 302-114-LR, Sheet 3

Components Subject to Aging Management Review

The table below identifies the Auxiliary Steam System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-2 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Auxiliary Steam System.

TABLE 2.3.4-2 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: AUXILIARY STEAM SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping Insulation	M-6 Thermal Insulation
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary

2.3.4.3 Condensate Chemical Treatment System

System Description

The Condensate Chemical Treatment System is primarily designed to inject hydrazine and amine solutions into the condensate line to maintain correct pH and dissolved oxygen concentrations in the turbine cycle. The system also provides:

1. capability for the bulk storage and transfer of aqueous amine solution to the amine batch tank;
2. automatic control of chemical feed rates; and
3. capability for dilution of concentrated chemicals.

The Condensate Chemical Treatment System consists of an amine batch tank, an amine injection pump, a hydrazine injection pump, a spare chemical injection pump, an additional amine injection pump, and a hydrazine batch tank. The system is located in the TB. The system assists, along with sampling and monitoring, in controlling feedwater chemistry by chemical injection into the condensate. During normal plant operation, dissolved oxygen is normally controlled by maintaining hydrazine in the feedwater. Feedwater pH is normally controlled by maintaining the pH between 8.5 and 9.3. During normal plant power operation the amine injection pump and the hydrazine injection pump continuously inject chemicals into the condensate. Continuous analyses for conductivity and residual hydrazine allow the automatic control of the feed rates for amine and hydrazine solutions, respectively. In the event of significant condenser coolant inleakage, when the condensate polishers are operated on the "hydrogen cycle," the additional amine injection pump would be manually operated to inject sufficient amine to raise the resultant low pH of the condensate demineralizer effluent.

The Condensate Chemical Treatment System is in the scope of License Renewal, because it contains:

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

2. Components that are relied on during postulated fires.

FSAR and Drawing References

The Condensate Chemical Treatment System is not described in the CR-3 FSAR.

There are no License Renewal scoping drawings that depict these components.

Components Subject to Aging Management Review

The components in the Condensate Chemical Treatment System that are in scope for License Renewal are civil and electrical components. Scoping and screening results for civil components are discussed in Section 2.4; for electrical components, in Section 2.5.

2.3.4.4 Condensate System

System Description

The function of the Condensate System is to collect condensed steam from the low-pressure turbines, feedwater pump turbines, heater drains, and leakoff from steam cycle equipment for use as condensate. The Condensate System delivers the condensate through demineralizers and heaters to the Main Feedwater System deaerator for use as steam generator feedwater. The system provides cooling water to the gland steam condenser and a means of makeup to the condensate system from the Demineralized Water System. The Condensate System provides a secondary water source for the EFW System in the event of a loss of the dedicated EFW Tank. The system also provides radiological dose mitigation during SGTR recovery. The SGTR licensing basis scenario specifically identifies the Main Condenser as a non-safety related component that is credited with a role in limiting offsite exposures. The Condensate System, including the Main Condensers, are credited for SGTR mitigation in scoping evaluations for License Renewal.

The Condensate System consists of two Main Condensers with a hotwell in the bottom of each, two Condensate Pumps, one Condensate Storage Tank, a condensate demineralizer train with six service vessels, one gland steam condenser, two parallel sets of three condensate heaters, and one deaerator. For License Renewal, the Main Condenser tubes are screened with the Condensate System.

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

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

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

3. Components that are relied on during postulated fires.

FSAR and Drawing References

The Condensate System is described in CR-3 FSAR Section 10.2.1.1.

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

302-101-LR, Sheet 1 302-101-LR, Sheet 2

Components Subject to Aging Management Review

The table below identifies the Condensate System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-3 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Condensate System.

TABLE 2.3.4-3 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CONDENSATE SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Condensate Pumps	M-1 Pressure-Boundary
Condensate Storage Tank	M-1 Pressure-Boundary
Condenser Hotwell Strainer	M-2 Filtration
Expansion Joints	M-1 Pressure-Boundary
LP Feedwater Heaters	M-1 Pressure-Boundary
Main Condenser	M-1 Pressure-Boundary
Main Condenser Tubes	M-5 Heat Transfer
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary

2.3.4.5 OTSG Chemical Cleaning System

System Description

The OTSG Chemical Cleaning System is designed to:

1. Provide for the wet layup of the OTSGs,
2. Provide permanent piping/connections to allow for chemical cleaning of the OTSGs,
3. Provide for the recirculation and mixing of the layup chemicals, and
4. Provide for sampling the chemical cleaning or passivating fluid.

The OTSG Chemical Cleaning System does not function during normal operating modes. The system is located in the Intermediate Building and consists of one layup pump, one layup solution tank, piping, and valves.

When wet layup is to be performed, the supply piping for the system is connected upstream of the OTSG EFW nozzles, and the return piping connects downstream of the OTSG main steam valves. System piping passes through Containment piping penetrations.

When chemical cleaning is to be performed, the system will be connected to the piping in the RB through Containment penetrations. The piping in the RB that is used to connect the system to the OTSGs for chemical cleaning is normally not installed. Additional piping, valves, tanks, and pumps will be added if, and when, a decision is made to chemically clean the OTSGs. Only permanently installed portions of the system are included in the scope of License Renewal.

The OTSG Chemical Cleaning System is in the scope of License Renewal, because it contains:

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

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

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

FSAR and Drawing References

The OTSG Chemical Cleaning System is shown on CR-3 FSAR Figure 9-32.

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

302-011-LR, Sheet 2 302-192-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the OTSG Chemical Cleaning System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-4 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – OTSG Chemical Cleaning System.

TABLE 2.3.4-4 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: OTSG CHEMICAL CLEANING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary

2.3.4.6 Condensate and Feedwater (CD & FW) Chemical Cleaning System

System Description

The CD & FW Chemical Cleaning System provides nitrogen for lay-up of the FW heaters, FW pumps, OTSGs, and various components in the Condensate System. The CD & FW Chemical Cleaning System consists of piping and valves that provide a flow path for nitrogen from nitrogen cylinders to the Condensate and the Main Feedwater Systems. The system provides a pressure boundary function for systems that mitigate a postulated SGTR event.

The CD & FW Chemical Cleaning System is in the scope of License Renewal, because it contains:

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

FSAR and Drawing References

The CD & FW Chemical Cleaning System is not described in the CR-3 FSAR.

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

302-195-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the CD & FW Chemical Cleaning System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-5 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – CD & FW Chemical Cleaning System.

TABLE 2.3.4-5 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CD & FW CHEMICAL CLEANING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.4.7 Condensate Demineralizer System

System Description

The principal function of the Condensate Demineralizer System is to remove dissolved solids, corrosion products, and suspended solids from the Condensate System by ion exchange and filtering through beds of ion exchange resins. The Condensate Demineralizer System permits plant operation to continue at full load when minor Main Condenser in-leakage of seawater occurs, permits an orderly shutdown of the plant when a large Condenser leak occurs, permits operation to continue when minor steam generator tube leaks occur, and permits automatic bypass of unpolished condensate under emergency conditions.

The Condensate Demineralizer System provides condensate meeting the required water quality to the Main Feedwater System in a controlled manner during normal operation. The system also provides radiological dose mitigation during SGTR recovery. The SGTR licensing basis scenario specifically identifies the Main Condenser as a non-safety related component that is credited with a role in limiting offsite exposures. The Condensate Demineralizer System supports the Main Condenser in performing this function.

The system consists of six demineralizer service vessels, two local control panels, one cation separation and regeneration tank, and one anion regeneration tank. The system also contains two condensate demineralizer bypass valves that will automatically open if an abnormally high differential pressure occurs across the common inlet and outlet header. The six demineralizers, which are arranged in parallel, contain a mixture of anion and cation resins. Five of the six demineralizers are in service during full load operations, and the sixth demineralizer is in standby.

Portions of the Condensate Demineralizer System associated with a small length of acid/caustic drain line in the AB are also in the License Renewal scope for potential spatial interaction.

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

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

<u>FSAR and Drawing References</u>

The Condensate Demineralizer System is described in Section 10.2.1.5 of the CR-3 FSAR.

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

302-161-LR, Sheet 1   302-161-LR, Sheet 2   302-163-LR, Sheet 2

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

The table below identifies the Condensate Demineralizer System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-6 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Condensate Demineralizer System.

TABLE 2.3.4-6 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CONDENSATE DEMINERALIZER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Flow restricting elements	M-1 Pressure-Boundary M-3 Throttle
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.4.8 Emergency Feedwater System

System Description

The EFW System is a standby system and is not operated in support of plant start-up or normal operation. The EFIC System automatically activates the EFW System components upon:

1. Loss of Main Feedwater (LMFW),
2. LMFW with LOOP,
3. Main Feedwater Line Break,
4. Main Steam Line Break,
5. Small Break LOCA, or
6. AMSAC initiation

When actuated, the EFW System pumps take the feedwater from the Dedicated Emergency Feedwater Tank and discharge it to the OTSGs. The EFW System is required to automatically supply sufficient emergency feedwater to one or both of the OTSGs to remove reactor decay heat and cool down the RCS until suitable conditions are attained to start the Decay Heat Removal System. The system also maintains steam generator level during the transition from forced to natural circulation when the RCPs are tripped.

The EFW System consists of two 100% capacity independent trains including two pumps, one diesel engine-driven and the other steam turbine-driven. Four separate injection lines into the two OTSGs are provided; each of the two EFW trains includes an injection line for each of the two OTSGs. The EFW System also contains a motor-driven pump that is maintained for defense-in-depth. The motor-driven pump is not automatically started by the EFIC System and is interlocked so that it does not start if the diesel-driven pump is running.

EFW System backup water sources include the Condensate Storage Tank and the Fire Water Storage Tanks. The water is boiled off by the steam generators during cooldown and vented to the atmosphere. The turbine-driven and the motor-driven EFW Pumps can also take suction from the Main Condenser hotwells.

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

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

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

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

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

FSAR and Drawing References

The Emergency Feedwater System is described in CR-3 FSAR Section 10.5.

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

302-082-LR, Sheet 1 302-082-LR, Sheet 2

Components Subject to Aging Management Review

The table below identifies the Emergency Feedwater System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-7 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Emergency Feedwater System.

TABLE 2.3.4-7 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: EMERGENCY FEEDWATER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Motor Driven Emergency Feedwater Pump	M-1 Pressure-Boundary

TABLE 2.3.4-7 (continued) COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: EMERGENCY FEEDWATER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Motor Driven Emergency Feedwater Pump Motor Cooler Components	M-1 Pressure-Boundary
Motor Driven Emergency Feedwater Pump Motor Cooler Tubes	M-5 Heat Transfer
Motor Driven Emergency Feedwater Pump Gear Oil Cooler Components	M-1 Pressure-Boundary
Motor Driven Emergency Feedwater Pump Gear Oil Cooler Tubes	M-5 Heat Transfer
Turbine Driven Emergency Feedwater Pump	M-1 Pressure-Boundary
Turbine Driven Emergency Feedwater Pump Turbine	M-1 Pressure-Boundary
Turbine Driven Emergency Feedwater Pump Turbine Governor Lube Oil Cooler Components	M-1 Pressure-Boundary
Turbine Driven Emergency Feedwater Pump Turbine Governor Lube Oil Cooler Tubes	M-5 Heat Transfer
Motor and Turbine Driven Emergency Feedwater Pump Cavitating Venturis	M-1 Pressure-Boundary M-3 Throttle
Diesel Driven Emergency Feedwater Pump	M-1 Pressure-Boundary
Diesel Driven Emergency Feedwater Pump Cavitating Venturi	M-1 Pressure-Boundary M-3 Throttle
Diesel Driven Emergency Feedwater Pump Recirculation Flow Elements	M-1 Pressure-Boundary M-3 Throttle
Diesel Driven Emergency Feedwater Pump Recirculation Orifices	M-1 Pressure-Boundary M-3 Throttle
Emergency Feedwater Tank	M-1 Pressure-Boundary
Flow restricting elements	M-1 Pressure-Boundary M-3 Throttle
Piping Insulation	M-6 Thermal Insulation
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary

2.3.4.9 Electro-Hydraulic Control System

System Description

The Electro-Hydraulic Control (EHC) System supplies a motive force to position the turbine governor, throttle, reheat, and intercept valves in response to electronic commands. The EHC System uses a combination of solid-state components and high-pressure hydraulics to control steam flow through the Main Turbine. The system allows automatic or manual turbine speed control from turning gear to rated speed and turbine load control from synchronization to full load. The system also provides equipment protection functions for the Turbine through the overspeed protection control circuits, valves, and the system interface with the turbine emergency trip system. The Turbine Control System has the potential to initiate plant transients.

The EHC System consists of 16 turbine valve actuator assemblies, a High Pressure Hydraulic Fluid System, an interface with the Auto-Stop Oil System, and a solid-state controller with a control panel. The Main Turbine uses 16 valves to control steam flow to the various elements of the Turbine. The valves are fitted with actuators that use hydraulic oil pressure to open the valves and spring tension to close them. Each of the 16 main turbine valve actuators is provided with a dump valve which allows EHC fluid to be rapidly drained from the valve actuator to initiate a Turbine trip. The High Pressure Hydraulic Fluid System consists of a fluid supply skid, pumps, accumulators, servo valves, dump valves, a trip fluid circuit, a pressurized return line, and sensors for alarms and indications.

The turbine is tripped by initiating a rapid closure of the turbine control valves in response to signals from the turbine protection systems. This action is accomplished through the functioning of the EHC System and the Auto-Stop Oil System. The EHC System and the Auto-Stop Oil System function to cause the turbine control valves to close rapidly whenever operating conditions threaten to damage the Main Turbine, Main Generator, or Reactor.

All of the EHC System components are located in the TB except the EHC step down transformer which is located in the Control Complex in a non-safety related cabinet. Therefore, there is no potential for adverse spatial interactions with safety related equipment. The EHC System contains heat exchangers that are in scope of License Renewal because they form part of the pressure boundary for the Secondary Services Closed Cycle Cooling Water System.

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

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

<u>FSAR and Drawing References</u>

The EHC System is briefly discussed in Section 10.2.1.4 of the CR-3 FSAR.

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

302-773-LR, Sheet 1

Components Subject to Aging Management Review

With the exception of the EHC System oil cooler tubes, the mechanical components and commodities of the system do not require an AMR. Failure of the pressure boundary of these components/commodities does not prevent them from performing their intended function, because loss of EHC System pressure results in a turbine trip by means of the rapid closure of the turbine control valves. The EHC System oil cooler tubes have a pressure boundary associated with the cooling water system as well as the oil system. The cooler tubes perform an intended function of maintaining the pressure boundary for the Secondary Services Closed Cycle Cooling Water System which is discussed in Subsection 2.3.3.51.

2.3.4.10 Main Feedwater System

System Description

The Main Feedwater System consists of two motor driven feedwater booster pumps, two turbine driven main feedwater pumps (MFPs), a deaerator, a deaerating heater storage tank, feedwater heaters, control and isolation valves, and connecting piping.

Each 55% capacity feedwater booster pump takes suction from the deaerating storage tank and pumps through redundant trains of intermediate pressure heaters to the suctions of the turbine driven MFPs. Feedwater is then pumped through the high pressure heaters to the feedwater regulating valves and into the OTSGs. A recirculation line to the de-aerating heater storage tank is provided for each MFP and feedwater booster pump.

The primary operational function of the Main Feedwater System is to automatically maintain the required water level in the OTSGs during normal plant operation. The Integrated Control System (ICS) positions the feedwater regulating valves at flow demands up to 50% of loop flow rate. At loop feedwater flow demands above 50%, flow is regulated by feedwater pump speed. In the feedwater line to each OTSG are three valves in parallel:

1. Throttling start-up valves that supply flow demands of 0% to 15% of the loop feedwater flow range,
2. Throttling low load valves that supply flows, in conjunction with the startup valves, at demands up to 50% of the loop feedwater flow range; and
3. Motor operated main block valves that open to supply flows above 50% of loop feedwater flow range.

The main feedwater and low load feedwater block valves are automatically closed by the ICS in the event of a reactor trip. The feedwater isolation and block valves for each OTSG are automatically closed by the EFIC System in the event of a steam line rupture to prevent feedwater addition to the affected OTSG. Automatic controls, independent of the ICS and supplied from ES power sources for the feedwater block valves, are designed to assure closure in the event of a steam line rupture. The MFP suction valves are supplied with the same closure signal supplied to the main feedwater main block valves, to assure feedwater isolation. The MFPs are also provided a trip signal from the EFIC signal on low OTSG pressure. The MFP, which is a non-safety related component, is required to trip as part of the redundant feedwater isolation capability.

Components in the Main Feedwater System provide the Containment isolation function and support the Main Condenser function of providing radiological dose mitigation following a postulated SGTR event.

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

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

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

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

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

FSAR and Drawing References

The Main Feedwater System is described in CR-3 FSAR Section 10.2.1.2.

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

302-081-LR, Sheet 1 302-081-LR, Sheet 2 302-081-LR, Sheet 4

Components Subject to Aging Management Review

The table below identifies the Main Feedwater System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-8 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Main Feedwater System.

TABLE 2.3.4-8 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: MAIN FEEDWATER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Auxiliary Feedwater Pump	M-1 Pressure-Boundary
Auxiliary Feedwater Pump Bearing Cooler Housing and Components	M-1 Pressure-Boundary
Auxiliary Feedwater Pump Bearing Cooler Tubes	M-5 Heat Transfer
Closure bolting	M-1 Pressure-Boundary
Containment Isolation Piping and Components	M-1 Pressure-Boundary
Deaerator	M-1 Pressure-Boundary
Feedwater Booster Pumps	M-1 Pressure-Boundary
Feedwater Booster Pumps Lube Oil Pumps	M-1 Pressure-Boundary
Feedwater Heaters	M-1 Pressure-Boundary
Flow restricting elements	M-1 Pressure-Boundary M-3 Throttle
Flow restricting orifice housing/plates	M-1 Pressure-Boundary M-3 Throttle
Main Feedwater Pump Turbine Lube Oil Pumps	M-1 Pressure-Boundary
Main Feedwater Pump Turbines	M-1 Pressure-Boundary
Main Feedwater Pumps	M-1 Pressure-Boundary
Piping Insulation	M-6 Thermal Insulation
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary
System Separator Filter/Housing	M-1 Pressure-Boundary M-2 Filtration
System strainer screens/elements	M-1 Pressure-Boundary M-2 Filtration

2.3.4.11 Gland Steam System

System Description

The Gland Steam System has no safety related functions. All of the mechanical components are located in the TB. There is no potential for adverse spatial interactions with safety related equipment. However, the Gland Steam System supports mitigation of offsite dose during a SGTR accident by providing sealing steam for the Main Turbine gland seals, MFP gland seals, and Main Turbine and MFP turbine control valve stem seals to prevent both air in-leakage to the Main Condenser and steam leakage to the TB. The Gland Steam System is included in the scope of License Renewal for these functions.

The Gland Steam System functions to prevent both air in-leakage to the Main Condenser and steam leakage to the TB. Gland seal steam is supplied to the system from the Auxiliary Steam System or the Main Steam System. Gland sealing steam flows through a desuperheater to the distribution header, which supplies the following loads:

1. High Pressure Turbine rotor gland seals,
2. Low pressure turbine rotor gland seals,
3. MFP turbine rotor seals,
4. High pressure stop valve and governor valve stem seals.

Any excess sealing steam at the pump turbine rotor is dumped to the Main Condenser via spillover valves. Low pressure leak-off from the various seal assemblies flows to the gland steam condenser.

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

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

FSAR and Drawing References

The Gland Steam System is not described in the CR-3 FSAR.

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

302-141-LR, Sheet 1   302-141-LR, Sheet 2   302-141-LR, Sheet 3

Components Subject to Aging Management Review

The table below identifies the Gland Steam System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-9 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Gland Steam System.

TABLE 2.3.4-9 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: GLAND STEAM SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Flow restricting orifice housing/plates	M-1 Pressure-Boundary M-3 Throttle

TABLE 2.3.4-9 (continued) COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: GLAND STEAM SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Gland Steam Condenser Components	M-1 Pressure-Boundary
Gland Steam Condenser Tubes	M-5 Heat Transfer
Piping, piping components, and piping elements	M-1 Pressure-Boundary
System strainer screens/elements	M-1 Pressure-Boundary M-2 Filtration

2.3.4.12 Gland Seal Water System

<u>System Description</u>

The Gland Seal Water System supplies gland seal water to the MFPs, feedwater booster pumps, condensate pumps, and valves for sealing the packing glands that are exposed to Main Condenser vacuum. Also, the system supplies cooling water to the Auxiliary Steam System and Gland Steam System desuperheaters and for spray flow to the exhaust hood area of the low pressure turbines. The system also supplies sealing water to the Condensate, Main Steam, Extraction Steam, Auxiliary Steam, EFW, Condenser Air Removal, and Heater Drains System valves for sealing the packing glands. The water exiting from these components is returned to the Main Condenser.

The Gland Seal Water System consists of two condensate injection pumps, two seal water return pumps, two duplex strainers, a seal drain return pot, a seal water return unit, and system level and pressure control valves.

The Gland Seal Water System aids in mitigating the off-site dose during a SGTR accident; therefore, the system is included in the scope of License Renewal.

The Gland Seal Water System is in the scope of License Renewal, because it contains:

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

<u>FSAR and Drawing References</u>

The Gland Seal Water System is not described in the CR-3 FSAR.

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

302-142-LR, Sheet 1 302-142-LR, Sheet 2

Components Subject to Aging Management Review

The table below identifies the Gland Seal Water System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-10 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Gland Seal Water System.

TABLE 2.3.4-10 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: GLAND SEAL WATER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Condensate Injection Pumps	M-1 Pressure-Boundary
Flow restricting orifice housing/plates	M-1 Pressure-Boundary M-3 Throttle
Piping, piping components, and piping elements	M-1 Pressure-Boundary
Seal Water Return Pumps	M-1 Pressure-Boundary
Seal Water Return Unit	M-1 Pressure-Boundary
System strainer screens/elements	M-1 Pressure-Boundary M-2 Filtration

2.3.4.13 Heater Drains System

System Description

The Heater Drains System consists of four high pressure reheater drain tanks, four low pressure reheater flash tanks, valves, controls, instrumentation and associated piping. This system also interfaces with six low pressure, two intermediate pressure, and two high pressure feedwater heaters, four moisture separator reheaters, deaerator, and condensers.

The function of the Heater Drains System is to drain, collect, and return condensate to the Main Feedwater System and in the process increase plant efficiency by extracting heat energy from the collected drainage and transferring this heat energy to the Main Feedwater System. The Heater Drains System increases plant efficiency by preheating the feedwater before it enters the OTSGs. The Heater Drains System is considered to be in License Renewal scope because of system instrumentation that provides an automatic trip of the turbine to protect against turbine water induction. This function is assumed to reduce the potential for turbine missile generation.

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

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

FSAR and Drawing References

The Heater Drains System is not described in the CR-3 FSAR.

There are no License Renewal scoping drawings that depict these components.

Components Subject to Aging Management Review

The components in the Condensate Chemical Treatment System that are in scope for License Renewal are electrical/I&C components. Scoping and screening results for electrical/I&C components are discussed in Section 2.5.

2.3.4.14 Heater Vents System

System Description

The Heater Vents System is part of the Heater Drains System. The Heater Vents System provides vent paths that allow the extraction steam to cascade by gravity through the drains, after the steam has given up its energy to the condensate and feedwater, to the next lower pressure heater. The Heater Vents remove non-condensible gases from the feedwater heaters.

The Heater Vents System contains safety-related fuses used for isolation purposes between Class 1E and non-Class 1E circuits. For this reason, the system has been brought into scope of License Renewal.

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

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

FSAR and Drawing References

The Heater Vents System is not described in the CR-3 FSAR.

The components that are in scope are electrical/I&C components. Therefore, there are no License Renewal scoping drawings that depict these components.

Components Subject to Aging Management Review

The components in the Heater Vents System that are in scope for License Renewal are electrical/I&C components. Scoping and screening results for electrical/I&C components are discussed in Section 2.5.

2.3.4.15 Main Feedwater Turbine Lube Oil System

System Description

The Main Feedwater Turbine Lube Oil System functions to provide lubricating oil to reduce bearing friction and remove bearing heat in both the Main Feedwater Pump (MFP) and turbine assemblies, the feedwater booster pumps, and to provide oil to the MFP turbine control oil system.

The oil system for each MFP consists of lubricating oil and control oil subsystems. The lube oil subsystem supplies lubricating oil to the MFP bearings, turbine main and thrust bearings, and turning gear. The control oil subsystem supplies high-pressure oil for motive power for the MFP turbine high and low pressure steam stop valves, governor assembly, and servomotor. Loss of control oil pressure to the MFP turbine governor and steam inlet valves indicates that the turbine has tripped. These signals are analyzed by the Reactor Protection System as part of the reactor anticipatory trip logic. The Main Feedwater Turbine Lube Oil System is conservatively included in License Renewal scope on the basis of supporting operation in accordance with the licensing basis for the SGTR accident. The system also has non-safety electrical components associated with control logic that have been designated as non-safety related equipment potentially affecting safety related equipment.

The oil system for each MFP consists of a reservoir, two oil coolers, two filters, a 3-way transfer valve, pressure regulators, accumulators, and manual and solenoid trip and test valves. The two AC-powered oil pumps and one DC powered oil pump associated with the Main Feedwater Turbine Lube Oil System are housed within the boundary of the associated oil reservoir.

The oil system for each feedwater booster pumps consists of a reservoir, oil cooler, filters, and valves. There is a shaft driven oil pump and auxiliary oil pump associated with each feedwater booster pump.

The oil pumps for both the feedwater booster pumps and the MFPs are considered to be part of the Main Feedwater System (Refer to Table 2.3.4-8).

The Main Feedwater Turbine Lube Oil System is in the scope of License Renewal, because it contains:

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

FSAR and Drawing References

The Main Feedwater Turbine Lube Oil System is not described in the CR-3 FSAR.

The License Renewal scoping boundaries for the Main Feedwater Turbine Lube Oil System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

302-770-LR, Sheet 1 302-770-LR, Sheet 2

Components Subject to Aging Management Review

The table below identifies the Main Feedwater Turbine Lube Oil System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-11 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Main Feedwater Turbine Lube Oil System.

TABLE 2.3.4-11 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: MAIN FEEDWATER TURBINE LUBE OIL SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Feedwater Pump Turbine Oil Reservoirs	M-1 Pressure-Boundary
Main Feedwater Pump Turbine and Booster Pump Lube Oil Cooler Components	M-1 Pressure-Boundary
Main Feedwater Pump Turbine and Booster Pump Lube Oil Cooler Tubes	M-5 Heat Transfer
Piping, piping components, and piping elements	M-1 Pressure-Boundary
System strainers	M-1 Pressure-Boundary M-2 Filtration

2.3.4.16 Main Steam System

System Description

The Main Steam System serves primarily to deliver steam from the OTSGs to the high pressure Turbine. There are two main steam lines from each of two OTSGs supplying steam to the main Turbine for a total of four lines. Each main steam line is provided with main steam safety valves.

Controlled steam relief to the atmosphere is provided by two atmospheric dump valves, which can be operated by backup high pressure bottles. Steam can be bypassed to the Main Condenser with four Turbine bypass valves. The system can supply steam to the EFW pump turbine, with required flow available from either Steam Generator. The four main steam isolation valves are located within the Seismic Class I Intermediate Building. These are tight shutoff, quick closing valves actuated by the plant operator from the Control Room or automatically in the event of a steam line break.

The Turbine stop valves are used as emergency stop valves, do not have a safety function, and are located on each end of the two steam chests at the high pressure Turbine. The valves are fail safe, so that the loss of either auto-stop oil pressure or EHC System fluid pressure will close the valves.

Operational functions of the Main Steam System include:

1. Supply steam to the Turbine Generator for power generation,
2. Provide steam temperature and pressure control during hot standby and plant cooldown by controlled dumping of steam to either the Main Condenser or the atmosphere,
3. Supply steam to Turbine Generator auxiliary systems,
4. Supply steam to the moisture separator reheaters,
5. Supply steam to the MFP turbines,
6. Provide the means of OTSG secondary side blowdown for water chemistry control,
7. Supply steam to the deaerator when extraction steam is not available, and
8. Supply steam to the Auxiliary Steam System during plant power escalation.

Safety functions of the Main Steam System include:

1. Provide automatic isolation of the Steam Generators for a steam line failure,
2. Provide adequate relief capacity to protect the OTSGs from overpressurization,
3. Control Steam Generator pressure and thereby provide a mechanism for controlled decay heat removal for a loss of electric power, steam line failure, LOCA, feedwater line break, and Steam Generator tube failure,

4. Provide steam to the EFW turbine-driven pump for various plant event scenarios, and
5. Provide the capability for RCS cooldown and effluent release control for a Steam Generator tube failure.

The Main Steam System also includes safety related monitoring instrumentation of the OTSGs and main steam line radiation monitors. Main Steam System instrumentation provides monitoring of selected variables after an accident.

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

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

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

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

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

<u>FSAR and Drawing References</u>

The Main Steam System is described in CR-3 FSAR Section 10.2.1.4.

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

302-011-LR, Sheet 1	302-011-LR, Sheet 2	302-011-LR, Sheet 3
302-111-LR, Sheet 3	302-114-LR, Sheet 1	302-114-LR, Sheet 2
302-114-LR, Sheet 3		302-051-LR, Sheet 1

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

The table below identifies the Main Steam System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-12 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Main Steam System.

TABLE 2.3.4-12 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: MAIN STEAM SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment Isolation Piping and Components	M-1 Pressure-Boundary
Expansion Joints	M-1 Pressure-Boundary
Piping Insulation	M-6 Thermal Insulation
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary

2.3.4.17 Relief Valve Vent System

System Description

The Relief Valve Vent System routes relief device discharges to the atmosphere. Venting is provided for main steam safety valves, atmospheric dump valves, and high pressure turbine reheat safety valves. The vents that are located in Seismic Category I buildings and that can adversely affect equipment required for the safe shutdown of the plant are in the scope of License Renewal.

The Relief Valve Vent System is in the scope of License Renewal, because it contains:

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

FSAR and Drawing References

The Relief Valve Vent System is not described in the CR-3 FSAR.

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

302-011-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the Relief Valve Vent System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-13 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Relief Valve Vent System.

TABLE 2.3.4-13 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: RELIEF VALVE VENT SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.4.18 Secondary Plant System

<u>System Description</u>

The Secondary Plant System instrumentation functions to measure temperatures, pressures, flows, and levels in the steam and auxiliary systems. The system monitors plant parameters in order to provide reliable inputs to control systems. The system provides inputs to the EFIC System, the ATWS System, the Non-nuclear Instrumentation System, and the Integrated Control System. The Secondary Plant System inputs used by the ATWS and Non-Nuclear Instrumentation System are separated physically and electrically into two independent channels. The design is not intended to provide the same degree of separation that is provided for protection systems, but the design is intended to accomplish the separation necessary to provide good reliability and minimize the likelihood of any single event causing a loss of redundant and essential indications and controls. The Secondary Plant System inputs provided to the EFIC System consist of four redundant channels.

Signals provided by the Secondary Plant System include Steam Generator level, temperature, and pressure; Main Steam System temperature; Main Feedwater System temperature and flow; and Turbine inlet pressure. The Secondary Plant System consists typically of process variable sensors, signal processing equipment, and a means of selecting and or transmitting the derived signals for use by the plant. These signals are input to control and computer systems for monitoring and indication and to satisfy various functional requirements. This system also includes mechanical component flow elements, located in the Intermediate Building that are required to provide a pressure boundary intended function.

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

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

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

3. Components that are relied on during postulated fires, anticipated transients without scram, and station blackout events, and

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

FSAR and Drawing References

The Secondary Plant System is not described in the CR-3 FSAR.

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

302-081-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the Secondary Plant System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-14 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Secondary Plant System.

TABLE 2.3.4-14 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: SECONDARY PLANT SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Flow restricting elements	M-1 Pressure-Boundary

2.3.4.19 Cycle Startup System

System Description

The Cycle Startup System is primarily designed to remove rust particles and oxidation products from the Main Feedwater System and to bring Main Feedwater System chemistry into specification before introducing feedwater to the OTSGs. This is accomplished by establishing cleanup flowpaths between the Deaerating Heater Storage Tank and the Main Condenser.

The Cycle Startup System consists of three separate sections of piping and valves. The first section of the system connects downstream of the feedwater booster pumps, bypasses the MFPs, and reconnects upstream of the high pressure feedwater heaters. The second section of the system connects downstream of the high pressure feedwater heaters, bypasses the OTSGs, and can either provide a cleanup flow path, via the Condensate Demineralizers, or connect to the Main Condenser. The third section of the system connects auxiliary steam to the deaerator sparger nozzles.

The Cycle Startup System includes non-safety related valves credited in the current seismic stress analyses, and fire seals associated with piping penetrations through fire barriers. The Cycle Startup System also includes piping and valves credited with supporting operation of the Main Condenser in mitigation of the SGTR accident.

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

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

2. Components that are relied on during postulated fires.

FSAR and Drawing References

The Cycle Startup System is not described in the CR-3 FSAR.

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

302-031-LR, Sheet 1

Components Subject to Aging Management Review

The table below identifies the Cycle Startup System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-15 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Cycle Startup System.

TABLE 2.3.4-15 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CYCLE STARTUP SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.4.20 Turbine Generator System

System Description

The Turbine Generator System converts thermal power in the Main Steam System and Reheat Steam System into electrical power leaving the Main Generator. The Turbine Generator System includes the high pressure turbine, both low pressure turbines, the main generator, the brushless exciter, and the Westinghouse voltage regulator. The Turbine Generator System also includes the isolated phase bus duct.

The main generator is a three-phase, 1,800 rpm, four pole, hydrogen inner-cooled machine, directly connected to the turbine through a solid coupling. The generator field (rotor) is the rotating portion of the generator. The stator is the stationary portion of the generator. Excitation to the main generator field is provided by the exciter. The exciter is a self-ventilated, air-cooled, direct-connected brushless exciter with static type voltage regulator.

The 22KV output of the main generator is directly connected to the main power transformers via the isolated phase bus. The transformers step up the generator's output voltage to a nominal 500KV for transmission and distribution to consumers. The output of the main generator is also connected to the unit auxiliary transformer (UAT) that supplies 6,900 volts and 4,160 volts to the unit auxiliary buses/Engineered Safeguards buses.

The Turbine Generator System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection. Specifically, solenoid valves are relied upon to protect the turbine from overspeed and, under certain fire scenarios, to trip the main turbine to control secondary pressure.

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

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

2. Components that are relied on during postulated fires.

FSAR and Drawing References

The Turbine Generator System is not described in the CR-3 FSAR; however, the main turbine trip function is briefly discussed in FSAR Section 10.2.1.4.

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

302-773-LR, Sheet 1	302-773-LR, Sheet 2

Components Subject to Aging Management Review

The components in the Turbine Generator System that are in scope of License Renewal consist of electrical/I&C and mechanical components and commodities. Scoping and screening of electrical/I&C components is addressed in Section 2.5.

The mechanical components and commodities of the system do not require an AMR because they either are active or failure of their passive pressure boundaries would not prevent them from performing their intended functions. Failure of a pressure boundary causes the loss of Auto Stop Oil pressure and a turbine trip by depressurizing the EHC System. As discussed in Subsection 2.3.4.9, loss of EHC System pressure would initiate the rapid closure of the turbine control valves. Thus, failure of the pressure boundary of the Turbine Generator System mechanical components/commodities that are in scope of License Renewal would result in the successful performance of the intended function of the system.

[This page intentionally blank]

2.4 SCOPING AND SCREENING RESULTS – STRUCTURES

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

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

The results of scoping and screening of structures are provided below in two Subsections: (1) Reactor Building, and (2) Other Class I and In-Scope Structures.

2.4.1 REACTOR BUILDING

Description

The Reactor Building (RB) is a Class I concrete structure with a cylindrical wall, a flat foundation mat, ring girder, and a shallow dome roof. The foundation slab is reinforced with conventional mild steel reinforcing. The cylinder wall is prestressed with a post-tensioning system in the vertical and horizontal directions. The dome roof is prestressed utilizing a three-way post-tensioning system. A ring girder, located at the intersection of the cylinder wall and the dome, provides the termination for two of three tendon systems. A tendon access gallery located on the underside of the RB foundation mat provides access to the vertical tendons. Six buttresses are provided, equi-spaced around the outer diameter of the cylinder wall. The buttresses are used as anchorage structures for the horizontal tendons. The foundation slab design took into consideration groundwater pressure and is provided with a water stop between the vertical cylinder wall and the foundation mat. The tendon gallery also incorporates a drainage system. The post-tensioning system is described in FSAR Section 5.2.2.3. A reinforced concrete Equipment Access Shield Structure surrounds and protects the RB equipment hatch.

The inside surface of the RB is lined with a carbon steel liner, to ensure a high degree of leak tightness during operating and accident conditions The liner has been anchored to the concrete to ensure composite action with the concrete shell. Nominal liner plate thickness is ⅜ in. for the cylinder and dome and ¼ in. for the base. A ¾ in. knuckle plate provides a transition between the cylinder and base. A cork material expansion joint filler is used between the ¾" thick steel knuckle plate and the concrete haunch at the base of the RB wall. The compressible material is such that the knuckle plate can deform and absorb strains produced by operating and accident conditions. A concrete floor is provided above the steel liner on the foundation mat. A moisture barrier is provided at the concrete floor interface with the RB outer wall liner plate. The carbon steel liner seams are provided with leak chase channels for leak tightness examination. The liner plate has been protected from internally generated missiles with the addition of special missile shields to supplement the primary and secondary shield structures discussed below. The foundation mat also incorporates a recess that provides a space for the Containment Sump. The recess is also lined with carbon steel liner plate. The sump itself is supported from the concrete floor and lined with stainless steel liner plate. The sump liner is not part of the RB pressure boundary.

The RB structure also includes mechanical and electrical system penetrations, the equipment hatch, and air locks. These are shown on FSAR Figures 5-2 and 5-3. The equipment hatch permits passage of large equipment and components into the RB. Two personnel air locks are provided; one is mounted in the equipment hatch. The personnel and equipment hatches and system penetrations are located inside Class I structures that are designed for tornado generated missiles. The RB steel-lined concrete pressure vessel, system penetrations, and personnel and equipment hatches form the pressure boundary of the RB. For mechanical system penetration pipes operating at a temperature equal to or greater than 150ºF, an expansion joint (bellows) was provided on the outside of-the-RB end the penetration to accommodate pipe movements.

The reactor cavity, which surrounds the Reactor Vessel (RV), has a raised concrete slab that supports the RV. The reactor cavity has a surrounding concrete wall referred to as the primary shield wall. There are two steam generator compartments whose surrounding concrete walls are referred to as the secondary shield walls. Each of the secondary shield walls contains one steam generator, two Reactor Coolant Pumps (RCPs), and associated Reactor Coolant System (RCS) piping; one also contains the Pressurizer. At the upper elevations, a horizontal cross section of the secondary shield walls is shaped like the letter "D"; these areas surrounding the steam generators are called the D-Rings. Additionally, there are removable missile shields located above the RV; these are removed during refueling. Concrete structures inside the RB include floors supported by structural steel, beams, piers, pedestals, shield walls, hatch blocks, curbs, and structural grout. There are no masonry walls in the RB.

The area between the steam generator compartments and above the reactor cavity is the Refueling Pool. The annular space between reactor vessel flange and the bottom of the fuel transfer canal is sealed-off by a permanently installed seal plate. The reactor cavity adjoins the fuel transfer canal that provides a passageway from the reactor to the fuel transfer tubes at the RB wall. The cavity and passageway are covered with a stainless steel liner, and these areas are filled with borated water during refueling operations. The two fuel transfer tubes provide the means to convey reactor fuel assemblies between the RB and the Auxiliary Building and are connected to Refueling Canal liner via expansion bellows.

The RB houses major plant equipment such as the RCS, Main Steam and Feedwater piping, and branch connections of the RCS. Custom support arrangements have been provided for the RCS primary components, such as, the RV, Once-Through Steam Generators (OTSGs), RCPs, and the Pressurizer. Supports for ASME Class 1, 2, and 3 piping and components and for non-ASME components are included within the structures contained in the RB. Additionally, whip restraints and jet impingement shields have been provided for the RCS and Main Steam and Feedwater piping.

Although cranes are active equipment, the passive structural components are considered to be within the scope of License Renewal. The cranes are associated with the passive physical crane structures such as the main structural members, bridge, trolley, structural girders, rail system, base plates, retaining clips, fasteners, welds, and attachments to the structure. The RB contains the following cranes that are in the scope of License Renewal:

- Polar Crane
- Reactor Vessel Tool Handling Jib Crane
- 5-Ton Jib Crane

- Main Fuel Handling Bridge
- Control Rod Drive Mechanism Jib Crane
- Monorail

Lifting devices that utilize a hoist have been screened in scope because of their associated monorail structural steel supports including structural connections to building steel or concrete structure. Monorails are included as part of the Reactor Building structural steel. The hoists themselves are screened out because they are active components and are normally removed during plant operation.

The Control Rod Drive Mechanism (CRDM) Service Structure is located on top of the RV Closure Head (RVCH) and is mounted on a support skirt connected to the RVCH. The support skirt acts as the CRDM cooling airflow plenum and has stainless steel cover hatches that are hinged for access to permit the periodic visual inspection of the CRDMs and the material condition of the RVCH. The CRDM Service Structure provides lateral restraint for the top of the CRDMs during seismic events. Other internal structures include anchorages/embedments, structural steel, platforms, racks, panels, cabinets, and enclosures for equipment, equipment supports, cable trays and conduits, embedded floor drains and grating for floor drains that mitigate the effects of flooding. Structural steel shield plugs containing concrete or sand are located in the annular space between the RV and the primary shield wall. In addition, internal structures include the stainless steel screens, cover plate, grating, support steel, trash racks, and strainers supporting the function of the Containment sump screens, and the stainless steel tri-sodium phosphate baskets used for pH control of the sump water.

Non-metallic civil/structural components/commodities in the RB include the moisture barrier that prevents intrusion of moisture against the inaccessible portions of the containment structure liner below the floor slab; and the seals and gaskets provided to assure containment leak-tight integrity, such as, the resilient seals on the equipment and personnel hatches and gaskets on mechanical and electrical system penetrations. Other non-metallic commodities include the insulation provided on various hot and cold piping penetrations and the radiation energy shielding installed for fire protection. The insulation for hot piping penetrations protects concrete from high temperature.
In addition, the permanently installed seal plate between the RV and the bottom of the refueling canal, as well as the access opening through the seal plate, are sealed by elastomer o-rings that are part of the seals and gaskets commodity.

The RB, RB Internals, and SCs contained in the RB perform many functions including the following:

1. The RB has been designed to contain radioactive material that could be released following a postulated accident,
2. The RB has been designed to withstand earthquake and tornado loads, including tornado-generated missiles,
3. The RB houses and supports major plant equipment, such as, the RCS, Main Steam and Feedwater piping, and branch connections of the RCS,
4. The RB houses and supports non-safety related equipment whose failure may adversely affect a safety related function in accordance with 10 CFR 54.4(a)(2),
5. The RB houses and supports non-safety related equipment that has been credited for mitigation of regulated events in accordance with 10 CFR 54.4(a)(3),
6. The RB and Internals provide radiation protection for equipment and biological shielding for personnel,
7. The RB and Internals are designed to protect the Containment liner and ES components from loss-of-function due to damage from missiles,
8. The RB Internals provide support for pipe whip restraints and missile shielding,
9. RB penetrations permit the passage of process piping and electrical circuits through the Containment boundary in support of post-accident functions,
10. Floor drains in the RB are credited for mitigating the effects of flooding,
11. RB Internals include radiant energy shielding that provides a fire protection function,
12. The RB sump design provides for long term heat removal by directing flow and providing filtration for the water used for long term cooling following a postulated accident, and
13. The RB Internal structures support the components that provide pH control of the emergency sump fluid.

Based on the results of the CR-3 scoping and screening review, the RB performs the following intended functions:

C-1	Structural Pressure Boundary
C-2	Structural Support for Criterion (a)(1) components
C-3	Shelter, Protection
C-4	Fire Barrier
C-6	Missile Barrier
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-8	Flood Barrier
C-11	Pipe Whip Restraint / HELB Shielding
C-12	Heat Sink
C-13	Direct Flow
C-14	Shielding
C-15	Expansion/Separation

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

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

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

3. SCs that are relied on during postulated fires, station blackout, and pressurized thermal shock events, and

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

FSAR and Drawing References

The RB is described in Sections 2.5.8, 5.1.1.1, 5.2, and 9.6 of the CR-3 FSAR. The RB and other major in-scope structures are shown on Figure 2.2-1.

Components Subject to Aging Management Review

The table below identifies the RB components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-1: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Reactor Building.

TABLE 2.4.1-1 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: REACTOR BUILDING

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Anchorage/Embedment	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Dome; Wall; Basemat; Ring Girder; Buttresses	C-1 Structural Pressure Boundary C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier C-12 Heat Sink C-14 Shielding

TABLE 2.4.1-1 (continued) COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: REACTOR BUILDING

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Concrete: Basemat	C-1 Structural Pressure Boundary C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-12 Heat Sink
Concrete Above Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-12 Heat Sink C-13 Direct Flow C-14 Shielding
Concrete Below Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection
Concrete Foundation	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection
Cranes	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Expansion Bellows	C-15 Expansion/Separation
Fire Barrier Assemblies	C-4 Fire Barrier
Floor Drains	C-8 Flood Barrier
Insulation	C-3 Shelter, Protection
Penetration Sleeves	C-1 Structural Pressure Boundary C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Personnel Airlock; Equipment Hatch	C-1 Structural Pressure Boundary C-3 Shelter, Protection C-8 Flood Barrier
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-11 Pipe Whip Restraint/HELB Shielding C-12 Heat Sink
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Seals and Gaskets	C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Seals, Gaskets, and Moisture Barriers	C-1 Structural Pressure Boundary C-3 Shelter, Protection

TABLE 2.4.1-1 (continued) COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: REACTOR BUILDING

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Steel Components: All Structural Steel	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-12 Heat Sink
Steel Components: Fuel Pool Liner	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-12 Heat Sink
Steel Elements: Liner; Liner Anchors; Integral Attachments	C-1 Structural Pressure Boundary C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-12 Heat Sink
Supports for ASME Class 1, 2, 3 Piping & Components	C-2 Structural Support for Criterion (a)(1) components C-12 Heat Sink
Supports for EDG, HVAC System Components, and Other Miscellaneous Equipment	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-12 Heat Sink
Supports for Non-ASME Piping & Components	C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-12 Heat Sink
Supports for Reactor Coolant System Primary Equipment	C-2 Structural Support for Criterion (a)(1) components C-12 Heat Sink
Tendons	C-2 Structural Support for Criterion (a)(1) components

2.4.2 OTHER CLASS I AND IN-SCOPE STRUCTURES

The following structures are included in this Subsection:

1. Auxiliary Building (Subsection 2.4.2.1)
2. Wave Embankment Protection Structure (Subsection 2.4.2.2)
3. Borated Water Storage Tank Foundation and Shield Wall (Subsection 2.4.2.3)
4. Cable Bridge (Subsection 2.4.2.4)
5. Control Complex (Subsection 2.4.2.5)
6. Intake and Discharge Canals (Subsection 2.4.2.6)
7. Circulating Water Discharge Structure (Subsection 2.4.2.7)
8. Circulating Water Intake Structure (Subsection 2.4.2.8)
9. Diesel Generator Building (Subsection 2.4.2.9)
10. EFW Pump Building (Subsection 2.4.2.10)
11. Dedicated EFW Tank Enclosure Building (Subsection 2.4.2.11)
12. Fire Service Pumphouse (Subsection 2.4.2.12)
13. Intermediate Building (Subsection 2.4.2.13)
14. Machine Shop (Subsection 2.4.2.14)
15. Miscellaneous Structures (Subsection 2.4.2.15)
16. Switchyard for Crystal River Site (Subsection 2.4.2.16)
17. Switchyard Relay Building (Subsection 2.4.2.17)
18. Turbine Building (Subsection 2.4.2.18)

2.4.2.1 Auxiliary Building

Description

The Auxiliary Building (AB) is a reinforced concrete structure from elevation 95 ft. (elevation 61 ft. in the sea water inlet pits) to elevation 162 ft., with a sheet metal enclosed structural steel superstructure from elevation 162 ft. to elevation 209 ft. The AB partially surrounds the RB and contains the new fuel racks and two spent fuel pools (Spent Fuel Pool A and Spent Fuel Pool B), as well as, various safety related equipment and components. The AB is founded on compacted backfill with a 1,500 psi concrete backfill overlying the foundation.

The AB is protected against flood levels up to elevation 129 ft. by water tight doors or panels at openings. Watertight sleeves around raw water sump vents protect the Auxiliary Building elevation 95 ft. against flood levels up to elevation 129 ft. The concrete portion of the AB, which houses Class I components, is designed for tornado generated missiles.

The Nuclear Service and Decay Heat Sea Water Pumps are located in the sea water room on elevation 95 ft. of the AB The pumps take suction from a raw water pit below the sea water room, The pit is supplied with water by two 48 in. diameter service water lines from the Circulating Water Intake Structure.

The Auxiliary Building contains a 120-Ton Fuel Handling Area Crane, a 10-ton Spent Fuel Pit Missile Shield Crane, a Spent Fuel Pool Handling Bridge Crane, and various monorails.

Based on the results of the CR-3 scoping and screening review, the AB performs the following intended functions:

C-2	Structural Support for Criterion (a)(1) components
C-3	Shelter, Protection
C-4	Fire Barrier
C-6	Missile Barrier
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-8	Flood Barrier
C-10	Absorb Neutrons
C-11	Pipe Whip Restraint / HELB Shielding
C-14	Radiation Shielding
C-15	Expansion/Separation

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

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

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

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

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

FSAR and Drawing References

The AB is described in Sections 2.4.2.4, 2.5.8, 5.1.1.1, 5.4, and 9.6 of the CR-3 FSAR. The AB and other major in-scope structures are shown on Figure 2.2-1.

Components Subject to Aging Management Review

The table below identifies the AB components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-2: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Auxiliary Building.

TABLE 2.4.2-1 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: AUXILIARY BUILDING

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Anchorage/Embedment	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Battery Rack (for emergency lighting)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Above Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier C-14 Radiation Shielding
Concrete Below Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier

TABLE 2.4.2-1 (continued) COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: REACTOR AUXILIARY BUILDING

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Concrete Foundation	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Submerged (sea water inlet pits)	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cranes	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Damper Mountings	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Door (Non-Fire)	C-3 Shelter, Protection C-8 Flood Barrier
Door	C-3 Shelter, Protection C-4 Fire Barrier
Draft Stop (at stairwell ceilings)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Expansion Bellows	C-15 Expansion/Separation
Fire Barrier Assemblies	C-4 Fire Barrier
Fire Barrier Penetration Seals	C-4 Fire Barrier
Fire Hose Stations	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Floor Drains	C-8 Flood Barrier
Masonry Walls	C-8 Flood Barrier
New Fuel Storage Rack	C-2 Structural Support for Criterion (a)(1) components
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier C-11 Pipe Whip Restraint/HELB Shielding
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Roof-Membrane/Built-up	C-3 Shelter, Protection
Seals and Gaskets	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier
Siding	C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Spent Fuel Storage Racks - includes a new fuel rack in the spent fuel pool. The Pool A spent fuel rack uses B_4C neutron absorber; the Pool B rack, boral	C-2 Structural Support for Criterion (a)(1) components C-10 Absorb Neutrons
Steel Components: All Structural Steel (includes monorail structural steel)	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Steel Components: Fuel Pool Liner	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for ASME Class 1, 2, 3 Piping & Components	C-2 Structural Support for Criterion (a)(1) components

TABLE 2.4.2-1 (continued) COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: REACTOR AUXILIARY BUILDING

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Supports for EDG, HVAC System Components, and Other Miscellaneous Equipment (includes HVAC fan vibration isolators)	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for Non-ASME Piping & Components	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.2 Wave Embankment Protection Structure

Description

The Wave Embankment Protection Structure, also called the Berm, is located at the perimeter of the protected area and surrounds the Class I structures, with the exception of structures associated with Nuclear Service and Decay Heat Sea Water intake from the Circulating Water Intake Structure and the EFW Pump Building, which is located on the embankment. The earthen embankment is identified as a unique structure within the Miscellaneous Mechanical & Structures System, discussed in Subsection 2.3.3.43, and is treated as a stand-alone structure for License Renewal. The base of the embankment is at elevation 98 ft. and rises to 118.5 ft. at the top. An armor covering of 3,000 psi reinforced concrete is provided for greater resistance against the increased wave forces on the southwest and south sides of the protected area. The reinforced concrete has a stepped profile and provides resistance to erosion and dynamic impact. Un-reinforced, 1,500 psi concrete is placed at the toe and at the top of the embankment to prevent possible undermining of the slope armor. The remainder of the Wave Embankment Protection Structure is covered with a fiberglass matting called "Fabriform" that mitigates erosion of the structure.

The foundation material upon which the embankment is constructed was placed in 1964 from on-site construction excavations. This material had nine years to consolidate with considerable construction activity surcharge. No significant settlement is anticipated for the foundation material placed in the embankment.

Based on the results of the CR-3 scoping and screening review, the Wave Embankment Protection Structure performs the following intended functions:

C-2	Structural Support for Criterion (a)(1) components
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-8	Flood Barrier

The Wave Embankment Protection Structure is in the scope of License Renewal because it contains:

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

2. SCs that are relied on during postulated station blackout events.

FSAR and Drawing References

The Wave Embankment Protection Structure is discussed in Section 2.4.2 of the CR-3 FSAR. The Wave Embankment Protection Structure and other major in-scope structures are shown on Figure 2.2-1.

Components Subject to Aging Management Review

The table below identifies the Wave Embankment Protection Structure components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-3: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Wave Embankment Protection Structure.

TABLE 2.4.2-2 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: WAVE EMBANKMENT PROTECTION STRUCTURE

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Concrete Above Grade	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Below Grade	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Foundation	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Earthen Berm (includes the “Fabriform” erosion control covering)	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier

2.4.2.3 Borated Water Storage Tank Foundation and Shield Wall

Description

The Borated Water Storage Tank Foundation and Shield Wall are Class I structures constructed of reinforced concrete and provide missile protection for the stainless steel Borated Water Storage Tank (BWST). The tank is a mechanical component and is addressed within the Decay Heat Removal System in Subsection 2.3.2.3. The tank foundation and shield wall are civil commodities and managed within the Borated Water Storage Tank Foundation and Shield Wall structure. The Borated Water Storage Tank Foundation and Shield Wall structure also includes an attached reinforced concrete structure containing two abandoned tanks, an HVAC system, a drain sump, associated piping supports and platforms, and the door that serves as the entrance to the structure. Section 2.4.2.4 of the FSAR identifies the entrance to the attached structure as a water tight door, used as protection against flooding up to elevation 129 ft.

The BWST rests on a portion of the AB roof; oiled sand has been placed under the tank bottom. The gap between the concrete missile barrier and the side of the stainless steel tank contains a one-inch thick Styrofoam filler; the gap is sealed at the top with caulking.

Based on the results of the CR-3 scoping and screening review, the Borated Water Storage Tank Foundation and Shield Wall perform the following intended functions:

C-2	Structural Support for Criterion (a)(1) components
C-3	Shelter, Protection
C-6	Missile Barrier
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-8	Flood Barrier

The Borated Water Storage Tank Foundation and Shield Wall are in the scope of License Renewal because they contain:

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

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

3. SCs that are relied on during postulated fires.

FSAR and Drawing References

The Borated Water Storage Tank Foundation and Shield Wall are not described in the CR-3 FSAR. FSAR Sections 2.4.2.4 mentions the water tight door at the entrance to the attached structure, and Section 5.1.1.1 identifies the structure itself as Class I. The Shield Wall is shown on FSAR Figure 1-15. The Borated Water Storage Tank and other major in-scope structures are shown on Figure 2.2-1.

Components Subject to Aging Management Review

The table below identifies the Borated Water Storage Tank Foundation and Shield Wall components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-4: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Borated Water Storage Tank Foundation and Shield Wall.

TABLE 2.4.2-3 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: BORATED WATER STORAGE TANK FOUNDATION AND SHIELD WALL

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Anchorage/Embedment	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Above Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier
Door (Non-Fire)	C-3 Shelter, Protection C-8 Flood Barrier
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Seals and Gaskets	C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier
Supports for EDG, HVAC System Components, and Other Miscellaneous Equipment	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for Non-ASME Piping & Components	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.4 Cable Bridge

Description

The Cable Bridge structure consists of two bridges supporting electrical cables that span the discharge canal. One bridge (the west bridge) is located northwest of the protected area approximately 350 ft. downstream of the Circulating Water Discharge Structure, and the other (the east bridge) is located north of the protected area at the head of the discharge canal. Both of the bridges provide support for electrical circuits required to mitigate a postulated station blackout (SBO) event.

The west Cable Bridge is an enclosed concrete tunnel which acts as a continuation of the cable tunnel from Crystal River Unit 1 to the 230KV Terminal House. The 230KV Terminal House is discussed in Subsection 2.4.2.17 and contains the DC power panels for two of the 230KV breakers required for SBO. The breakers receive their power from the Crystal River Unit 1 and Unit 2 (CR-1 and CR-2) plant batteries through cables routed within the west Cable Bridge. Also, power cables required for the SBO event are routed across the bridge. An exposed walkway exists on top of the cable bridge along with a series of conduits and supports. The west Cable Bridge is supported at mid span with a submerged concrete pier. Due to the unique configuration of the cable tunnel, the concrete tunnel from CR-1 to the west Cable Bridge and from the Cable Bridge to the 230KV Terminal House is included within the Cable Bridge structure.

The east Cable Bridge is a structural steel truss whose ends rest on concrete abutments. The Cable Bridge carries electrical conduits required for the SBO event. The SBO conduits are considered to be within the Cable Bridge Structure from where they exit the ground to cross the bridge to where they re-enter the ground on the other side of the bridge.

Based on the results of the CR-3 scoping and screening review, the Cable Bridge performs the following intended function:

C-7	Structural Support for Criterion (a)(2) and (a)(3) components

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

1. SCs that are relied on during postulated station blackout events.

FSAR and Drawing References

The Cable Bridge is not described in the CR-3 FSAR; however, FSAR Section 5.1.1.2 indicates that it is a Class II structure. The east and west Cable Bridges and other major in-scope structures are shown on Figure 2.2-1.

Components Subject to Aging Management Review

The table below identifies the Cable Bridge components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-5: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Cable Bridge.

TABLE 2.4.2-4 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CABLE BRIDGE

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Anchorage/Embedment	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Above Grade	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Below Grade	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Foundation	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Submerged	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Door (Non-Fire)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Steel Components: All Structural Steel	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.5 Control Complex

Description

The Control Complex is a six-floor concrete structure, with a bottom floor elevation at 95 ft. and roof elevation at 198 ft. A stairwell and an elevator shaft are located in the northwest corner of the structure. Additionally, there is a penthouse located on top of the stairwell/elevator structure.

The Control Complex is designed with an emergency ventilation system that provides an enclosed environment from which the plant can be operated following an uncontrolled release of radioactivity or toxic gas (Refer to Subsection 2.3.3.11). The Control Complex habitability envelope includes Control Complex floor elevations from 108 ft. through 180 ft. and the stair enclosure.

The Control Complex is founded on concrete fill overlaying cement-grouted limerock. The Control Complex is surrounded on three sides by buildings that are flood protected, and the side toward the Machine Shop is flood protected; therefore, it is protected from external flooding. The concrete portion of the Control Complex, which houses Class 1 components, is designed for tornado generated missiles.

The Control Complex houses the Main Control Room, and safety related equipment and components that control and operate the reactor and NSSS Systems. Additionally, the

Control Complex houses electrical switchgear, emergency batteries, battery chargers, and fire protection equipment

Based on the results of the CR-3 scoping and screening review, the Control Complex performs the following intended functions:

C-1	Structural Pressure Boundary
C-2	Structural Support for Criterion (a)(1) components
C-3	Shelter, Protection
C-4	Fire Barrier
C-6	Missile Barrier
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-8	Flood Barrier

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

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

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

3. SCs that are relied on during postulated fires, anticipated transients without scram, and station blackout events.

FSAR and Drawing References

The Control Complex is not described in the CR-3 FSAR. The Control Room is discussed in FSAR Sections 1.4.11, 2.4.2.4, 5.1.1.1 and 7.4. The Control Complex and other major in-scope structures are shown on Figure 2.2-1.

Components Subject to Aging Management Review

The table below identifies the Control Complex components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-6: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Control Complex.

TABLE 2.4.2-5 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CONTROL COMPLEX

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Anchorage/Embedment	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Battery Rack	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Above Grade	C-1 Structural Pressure Boundary C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier
Concrete Below Grade	C-1 Structural Pressure Boundary C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier
Concrete Foundation	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Control Room Ceiling	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Damper Mountings	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Door	C-1 Structural Pressure Boundary C-3 Shelter, Protection C-4 Fire Barrier
Fire Barrier Assemblies	C-4 Fire Barrier
Fire Barrier Penetration Seals	C-4 Fire Barrier
Fire Hose Stations	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Floor Drains	C-8 Flood Barrier
Masonry Walls	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Phase Bus Duct Enclosure Assemblies	C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Raised Floor	C-2 Structural Support for Criterion (a)(1) components C-4 Fire Barrier
Roof-Membrane/Built-up	C-3 Shelter, Protection
Steel Components: All Structural Steel	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components

TABLE 2.4.2-5 (continued) COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CONTROL COMPLEX

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Supports for ASME Class 1, 2, 3 Piping & Components	C-2 Structural Support for Criterion (a)(1) components
Supports for EDG, HVAC System Components, and Other Miscellaneous Equipment	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for Non-ASME Piping & Components	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.6 Intake and Discharge Canals

Description

The Intake Canal, which is an earthen structure, extends about eight miles from the Circulating Water Intake Structure into the Gulf of Mexico. When originally constructed for Units 1 and 2 in the 1960s, it had a design bottom elevation of 73 ft. relative to plant datum from the Gulf to the barge turning basin. The design bottom elevation from the entrance of the turning basin to the intake structures for Units 1 and 2 was 70 ft. In recent years, the canal bottom between the Gulf and the Unit 1 and 2 intake structures has been dredged in order to accommodate larger coal barges. During construction of Unit 3, the Intake Canal was extended eastward approximately 600 ft. to provide cooling water to the nuclear unit. At the entrance of the extension, the design bottom elevation is 70 ft. Near the midpoint of the extension, the bottom slopes downward to elevation 67 ft. The base width of the Intake Canal, at the CR-3 segment, is 70 ft.

FSAR Section 9.5.2.1.2 evaluates the design of the Intake Canal, and concludes that the extremely large Intake Canal flow area precludes the possibility of any vessel or natural phenomena obstructing the canal to the extent that the minimum required cooling water flow for maintaining the reactor in cold shutdown condition cannot pass. However, operating experience at other plants and review of previous applications has shown that Intake Canals may require ongoing maintenance to address potential for silting/fouling. Therefore, the portion of the Intake Canal extending from the entrance at the mainland to the Circulating Water Intake Structure is conservatively included in the scope of License Renewal against the criteria of 10 CFR 54.4(a)(2).

The Discharge Canal, which is an earthen structure, is an open channel extending from the Circulating Water Discharge Structure to the Gulf of Mexico. The base width of the Discharge Canal is 125 ft. Unlike the Intake Canal, flow into the Discharge Canal is pressurized by upstream process pumps, and gradual blockage by silting is not considered to be a credible failure mode. In addition, the Discharge Canal is not included in the Ultimate Heat Sink for CR-3. The Ultimate Heat Sink consists of the Gulf of Mexico, connected to the Intake Structure by the man-made Intake Canal. There are no credible failure modes described in the FSAR or other licensing documentation for the Discharge Canal which would prevent any in-scope systems from discharging water into the Discharge Canal. Based on the pressurized system design into the Discharge Canal, open canal configuration, the water level elevation well below plant grade, exclusion of the Discharge Canal from the Ultimate Heat Sink, and no credible failure modes described in the FSAR other licensing documentation for the Discharge Canal, the Discharge Canal does not support a License Renewal intended function.

Based on the results of the CR-3 scoping and screening review, the Intake Canal performs the following intended functions:

C-5	Shutdown Cooling Water
C-7	Structural Support for Criterion (a)(2) and (a)(3) components

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

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

FSAR and Drawing References

The Intake and Discharge Canals are described in Sections 2.4.2.3, 2.4.2.4, and 9.5.2.1.2 of the CR-3 FSAR. The Intake and Discharge Canals in the immediate vicinity of the plant are shown on Figure 2.2-1.

Components Subject to Aging Management Review

The table below identifies the Intake and Discharge Canal components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-7: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Intake and Discharge Canal.

TABLE 2.4.2-6 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: INTAKE AND DISCHARGE CANALS

Component/Commodity	**Intended Function(s)** **(See Table 2.1-1 for function definitions)**
Earthen Water-Control Structures: Dams, embankments, reservoirs, channels, canals and ponds	C-5 Shutdown Cooling Water C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.7 Circulating Water Discharge Structure

Description

The Circulating Water Discharge Structure scope encompasses both the Nuclear Service Sea Water Discharge Structure and the Circulating Water Discharge Structure. The Circulating Water Discharge Structure is a U-shaped reinforced concrete structure, located north of the CR-3 protected area on the south side of the Discharge Canal. The Nuclear Service Sea Water Discharge Structure is a separate structure located on the south bank of the Discharge Canal approximately 150 ft. west of the Circulating Water Discharge Structure.

Four 8-ft. diameter Circulating Water System (Refer to Subsection 2.3.3.25) discharge lines enter the south bulkhead wall of the Circulating Water Discharge Structure. Flow from these lines is discharged into the basin of the discharge structure. An 11 ft.-high weir crosses the discharge basin directly in the path of the discharge to control flow and mitigate discharge canal erosion. After passing over the weir, discharge flow enters the Discharge Canal. The Circulating Water Discharge Structure does not include the underground Circulating Water Discharge lines; these are addressed as part of the Circulating Water System.

The Circulating Water Discharge Structure is required to maintain structural integrity in support of the Steam Generator Tube Rupture event.

The Nuclear Service Sea Water Discharge Structure is a reinforced concrete structure containing two 48-in. diameter nuclear sea water lines. The sea water discharge lines travel through the concrete structure and discharge directly into the Discharge Canal. The structure does not include the underground Nuclear Service Sea Water lines; these are addressed as part of the Nuclear Service and Decay Heat Sea Water System. The Nuclear Service Sea Water Discharge Structure is required to ensure that the Nuclear Service and Decay Heat Sea Water System (Refer to Subsection 2.3.3.49) lines remain open and are capable of discharging to the Discharge Canal.

Based on the results of the CR-3 scoping and screening review, the Circulating Water Discharge Structure performs the following intended function:

C-7	Structural Support for Criterion (a)(2) and (a)(3) components

The Circulating Water Discharge Structure is in the scope of License Renewal because it contains:

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

<u>FSAR and Drawing References</u>

The Circulating Water Discharge Structure is not described in the CR-3 FSAR; however, the Circulating Water System discharge structure is shown on FSAR Figure 1-18. The Circulating Water Discharge Structure and the Nuclear Service Sea Water Discharge Structure, as well as other major in-scope structures, are shown on Figure 2.2-1.

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

The table below identifies the Circulating Water Discharge Structure components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-8: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Circulating Water Discharge Structure.

TABLE 2.4.2-7 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CIRCULATING WATER DISCHARGE STRUCTURE

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Concrete Above Grade	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Below Grade	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Foundation	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Submerged	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.8 Circulating Water Intake Structure

<u>Description</u>

The Circulating Water Intake Structure includes the Nuclear Service Sea Water Intake Structure. The Nuclear Service and Decay Heat Sea Water System is discussed in Subsection 2.3.3.49. The Circulating Water Intake Structure is a reinforced concrete structure, located south of the protected area. The structure supports the circulating water pumps, traveling screens, trash racks, the Intake Gantry Crane, and the Class I Nuclear Service Sea Water Intake Structure.

The Circulating Water Intake Structure may be inundated by postulated high sea levels during a hurricane; however, no active equipment necessary to maintain the plant in a safe condition is located at the intake structure. To support safe shutdown of the plant, sea water is conveyed to the raw water sump pit in the AB by two redundant 48 in. diameter intake conduits. At the Circulating Water Intake Structure, one intake conduit shares a common intake, bar racks, and traveling screens with the Circulating Water System; while the other intake conduit is supplied with a separate bar rack and traveling screen located in the Nuclear Service Sea Water Intake Structure. The Circulating

Water Intake Structure does not include the underground Circulating Water or Nuclear Service and Decay Heat Sea Water System lines. The Circulating Water Intake Structure is required to maintain structural integrity in support of the Steam Generator Tube Rupture event. SCs in scope of License Renewal include the trash racks at the Circulating Water Intake Structure. Traveling screens are not in scope because they are not needed to support a Steam Generator Tube Rupture event.

The only safety related components within the Circulating Water Intake Structure boundary are the reinforced concrete structures associated with the Nuclear Service Sea Water intake conduits. The Nuclear Service Sea Water intake portion of the structure is considered a seismic interaction area because the non-safety related Intake Gantry Crane could potentially fall on this part of the structure.

Based on the results of the CR-3 scoping and screening review, the Circulating Water Intake Structure performs the following intended functions:

C-2	Structural Support for Criterion (a)(1) components
C-5	Shutdown Cooling Water
C-7	Structural Support for Criterion (a)(2) and (a)(3) components

The Circulating Water Intake Structure is in the scope of License Renewal because it contains:

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

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

FSAR and Drawing References

The Circulating Water Intake Structure is discussed in Sections 2.4.2 and 5.1.1.1 of the CR-3 FSAR. It is shown on FSAR Figure 1-17. The Circulating Water Intake Structure and other major in-scope structures are shown on Figure 2.2-1.

Components Subject to Aging Management Review

The table below identifies the Circulating Water Intake Structure components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-9: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Circulating Water Intake Structure.

TABLE 2.4.2-8 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CIRCULATING WATER INTAKE STRUCTURE

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Anchorage/Embedment	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Above Grade	C-2 Structural Support for Criterion (a)(1) components C-5 Shutdown Cooling Water C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Below Grade	C-2 Structural Support for Criterion (a)(1) components C-5 Shutdown Cooling Water C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Foundation	C-2 Structural Support for Criterion (a)(1) components C-5 Shutdown Cooling Water C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Submerged	C-2 Structural Support for Criterion (a)(1) components C-5 Shutdown Cooling Water C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cranes	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for Non-ASME Piping & Components	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.9 Diesel Generator Building

Description

The Diesel Generator Building is located adjacent to the Class I AB on its west side and Class III Machine Shop on its north side. It is a single story reinforced concrete structure at elevation 119 ft. with the roof at elevation 143 ft. and is founded on structural concrete backfill overlying cement-grouted native limerock.

The Diesel Generator Building is protected from flooding by two steel barriers at the outer side of the air intake enclosure walls capable of providing protection to an elevation of 129 ft. The concrete structure of the Diesel Generator Building is designed for tornado generated missiles and earthquakes.

The Diesel Generator Building houses and supports the two stand-by Diesel Generators (A and B), their exhaust silencers, and various safety related equipment and components. There is also a radiator exhaust air deflector wall and support structure located on the Diesel Generator Building's east and south walls. The deflector wall is missile resistant, but not missile proof. The air deflector wall is necessary to minimize the amount of exhaust air that can be recirculated to the air intake in order to assure the engine design performance can be maintained.

There are two diesel fuel oil tanks for the Diesel Generators that are buried south of the Diesel Generator Building inside the protected area. The License Renewal scoping evaluation for the diesel fuel oil tank support structures is addressed with the Miscellaneous Structures (Refer to Subsection 2.4.2.15).

Based on the results of the CR-3 scoping and screening review, the Diesel Generator Building performs the following intended functions:

C-2	Structural Support for Criterion (a)(1) components
C-3	Shelter, Protection
C-4	Fire Barrier
C-6	Missile Barrier
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-8	Flood Barrier
C-13	Direct Flow

The Diesel Generator Building is in the scope of License Renewal because it contains:

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

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

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

FSAR and Drawing References

The Diesel Generator Building is described in Sections 2.4.2.4, 5.1.1.1, and 5.4 of the CR-3 FSAR. The Diesel Generator Building and other major in-scope structures are shown on Figure 2.2-1.

Components Subject to Aging Management Review

The table below identifies the Diesel Generator Building components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-10: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Diesel Generator Building.

TABLE 2.4.2-9 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: DIESEL GENERATOR BUILDING

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Anchorage/Embedment	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Battery Rack	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Above Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier C-13 Direct Flow
Concrete Below Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier
Concrete Foundation	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Damper Mountings	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Door	C-3 Shelter, Protection C-4 Fire Barrier
Fire Barrier Penetration Seals	C-4 Fire Barrier
Floor Drains	C-8 Flood Barrier
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Roof-Membrane/Built-up	C-3 Shelter, Protection
Seals and Gaskets	C-8 Flood Barrier
Steel Components: All Structural Steel	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for ASME Class 1, 2, 3 Piping & Components	C-2 Structural Support for Criterion (a)(1) components
Supports for EDG, HVAC System Components, and Other Miscellaneous Equipment	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for Non-ASME Piping & Components	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.10 EFW Pump Building

Description

The Class I EFW Pump Building (EFPB) is a single story reinforced concrete structure with a reinforced concrete roof slab. The structure is founded on a wave step panel of the Wave Embankment Protection Structure and suitable existing compacted fill. The EFPB floor elevation is at 114.5 ft.; the roof, at 150 ft.; and the building includes a mezzanine. The EFPB is protected from flooding by three water-tight doors at the entrance giving flood protection up to 135 ft. The concrete structure of the EFPB houses Class I components and is designed for tornado-generated missiles.

The EFPB consists of a battery room, a tank room, and a diesel pump room. The latter houses the diesel-driven pump for the EFW System. The diesel-driven pump supports one of the two redundant EFW System trains. The diesel-driven pump also incorporates an exhaust line, a silencer, and exhaust stackhead. The EFPB houses a 3-Ton Crane and is separate from other plant buildings and structures but in close proximity to the Class I Dedicated EFW Tank Enclosure Building.

Based on the results of the CR-3 scoping and screening review, the EFPB performs the following intended functions:

C-2	Structural Support for Criterion (a)(1) components
C-3	Shelter, Protection
C-4	Fire Barrier
C-6	Missile Barrier
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-8	Flood Barrier

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

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

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

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

FSAR and Drawing References

The EFPB is described in Sections 2.4.2.4, 5.1.1.1 and 5.4.7 of the CR-3 FSAR. The EFPB and other major in-scope structures are shown on Figure 2.2-1.

Components Subject to Aging Management Review

The table below identifies the EFPB components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-11: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – EFW Pump Building.

TABLE 2.4.2-10 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: EFW PUMP BUILDING

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Anchorage/Embedment	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Battery Rack	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Above Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier
Concrete Below Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier
Concrete Foundation	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cranes	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Damper Mountings	C-2 Structural Support for Criterion (a)(1) components
Door (Non-Fire)	C-3 Shelter, Protection C-8 Flood Barrier
Door	C-4 Fire Barrier
Fire Barrier Assemblies	C-4 Fire Barrier
Floor Drains	C-8 Flood Barrier
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Seals and Gaskets	C-3 Shelter, Protection C-8 Flood Barrier
Steel Components: All Structural Steel	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components

TABLE 2.4.2-10 (continued) COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: EFW PUMP BUILDING

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Supports for ASME Class 1, 2, 3 Piping & Components	C-2 Structural Support for Criterion (a)(1) components
Supports for Non-ASME Piping & Components	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.11 Dedicated EFW Tank Enclosure Building

Description

The Dedicated EFW Tank Enclosure Building is a single story, reinforced concrete, Class I structure at elevation 114.5 ft. with a sloping roof having a high point elevation at 168 ft. 5 in. The Dedicated EFW Tank Enclosure Building is protected from flooding by a water tight door at the entrance giving flood protection up to 129 ft.

The Class I Dedicated EFW Tank Enclosure Building houses the EFW Tank and associated piping components.

Based on the results of the CR-3 scoping and screening review, the Dedicated EFW Tank Enclosure Building performs the following intended functions:

C-2	Structural Support for Criterion (a)(1) components
C-3	Shelter, Protection
C-6	Missile Barrier
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-8	Flood Barrier

The Dedicated EFW Tank Enclosure Building is in the scope of License Renewal because it contains:

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

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

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

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

FSAR and Drawing References

The Dedicated EFW Tank Enclosure Building is described in Sections 2.4.2.4, 5.1.1.1, and 5.4.6 of the CR-3 FSAR. The Dedicated EFW Tank Enclosure Building and other major in-scope structures are shown on Figure 2.2-1.

Components Subject to Aging Management Review

The table below identifies the Dedicated EFW Tank Enclosure Building components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-12: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Dedicated EFW Tank Enclosure Building.

TABLE 2.4.2-11 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: DEDICATED EFW TANK ENCLOSURE BUILDING

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Anchorage/Embedment	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Above Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier
Concrete Below Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier
Concrete Foundation	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Damper Mountings	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Door (Non-Fire)	C-3 Shelter, Protection C-8 Flood Barrier
Floor Drains	C-8 Flood Barrier
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Seals and Gaskets	C-3 Shelter, Protection C-8 Flood Barrier
Steel Components: All Structural Steel	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for ASME Class 1, 2, 3 Piping & Components	C-2 Structural Support for Criterion (a)(1) components
Supports for Non-ASME Piping & Components	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.12 Fire Service Pumphouse

Description

The Fire Service Pumphouse is a single story concrete masonry structure with a built-up membrane roof. It is supported on a concrete mat foundation that is located on grade. The Fire Service Pumphouse floor elevation is at 119 ft. with the steel roof top at approximately 131 ft. elevation.

The Fire Service Pumphouse contains three fire service pumps, two diesel-driven and one electric motor-driven, which provide operating pressure under system use. There is also a motor-driven pressure maintenance (Jockey) pump. The fire service water for CR-3 originates from well fields to the east of the nuclear site, and is kept in storage tanks at Units 1 and 2. When required, fire service water is pumped through a 12-inch main by two 1,000 gpm pumps to the CR-3 Fire Service Water System. There are two storage tanks containing 600,000 gallons of water dedicated to fire service located west of the CR-3 TB.

The Fire Service Pumphouse is separate from other plant buildings and structures but in close proximity to the RB and the Intermediate Building.

Based on the results of the CR-3 scoping and screening review, the Fire Service Pumphouse performs the following intended function:

C-7	Structural Support for Criterion (a)(2) and (a)(3) components

The Fire Service Pumphouse is in the scope of License Renewal because it contains:

1. SCs that are relied on during postulated fires.

FSAR and Drawing References

The Fire Service Pumphouse is described in Section 9.8.7.1 of the CR-3 FSAR. It is shown on Figure 1-20. The Fire Service Pumphouse and other major in-scope structures are shown on Figure 2.2-1.

Components Subject to Aging Management Review

The table below identifies the Fire Service Pumphouse components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-13: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Fire Service Pumphouse.

TABLE 2.4.2-12 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: FIRE SERVICE PUMPHOUSE

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Anchorage/Embedment	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Above Grade (equipment foundation pads)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Foundation	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Damper Mountings	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Door (Non-Fire)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Masonry Wall	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Roof-Membrane/Built-up	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Steel Components: All Structural Steel	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for EDG, HVAC System Components, and Other Miscellaneous Equipment	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for Non-ASME Piping & Components	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.13 Intermediate Building

Description

The Intermediate Building is a reinforced concrete structure from elevation 95 ft. to the roof elevation of 149 ft. that partially surrounds the RB. There are two floor levels in the Intermediate Building at 95 ft. elevation and 119 ft. elevation. The Intermediate Building concrete roof supports a missile protected vent house. The Intermediate Building 95 ft. elevation is founded on structural concrete backfill overlaying cement-grouted limerock. The areas of the Intermediate Building without a 95 ft. elevation (i.e., 119 ft. elevation only) are supported on a concrete mat foundation that is located on compacted backfill. The Intermediate Building houses Class I components and is designed for tornado-generated missiles.

The Intermediate Building houses RB leak rate test equipment, as well as, various safety related equipment and components, and contains a portion of the Main Steam lines that originate in the RB and terminate in the TB. The Intermediate Building at elevation 95 ft. also houses a turbine-driven pump and a defense-in-depth motor-driven pump for the EFW System. The turbine-driven pump and motor-driven pump support one of the two EFW System trains. The Intermediate Building roof supports non-safety related Industrial Cooling Water System RB chillers, pumps, cooling towers, and associated piping components.

The Intermediate Building is adjacent to the following Class I structures: RB, Control Complex, Auxiliary Building, and the following Class III structures: Turbine Building and Fire Service Pump House.

Based on the results of the CR-3 scoping and screening review, the Intermediate Building performs the following intended functions:

C-2	Structural Support for Criterion (a)(1) components
C-3	Shelter, Protection
C-4	Fire Barrier
C-6	Missile Barrier
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-8	Flood Barrier
C-11	Pipe Whip Restraint/HELB Shielding

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

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

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

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

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

FSAR and Drawing References

The Intermediate Building is described in Sections 5.1.1.1 and 5.4 of the CR-3 FSAR. The Intermediate Building is shown on FSAR Figures 1-5 and 1-7 and on Figure 2.2-1.

Components Subject to Aging Management Review

The table below identifies the Intermediate Building components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-14: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Intermediate Building.

TABLE 2.4.2-13 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: INTERMEDIATE BUILDING

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Anchorage/Embedment	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Battery Rack	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Above Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier
Concrete Below Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier
Concrete Foundation	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Damper Mountings	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Door (Non-Fire)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Door	C-3 Shelter, Protection C-4 Fire Barrier
Fire Barrier Assemblies	C-4 Fire Barrier
Fire Barrier Penetration Seals	C-4 Fire Barrier
Fire Hose Stations	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Floor Drains	C-8 Flood Barrier
Phase Bus Duct Enclosure Assemblies	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Misc. Structures	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-11 Pipe Whip Restraint/HELB Shielding
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Roof-Membrane/Built-up	C-3 Shelter, Protection
Seals and Gaskets	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier
Steel Components: All Structural Steel	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for ASME Class 1, 2, 3 Piping & Components	C-2 Structural Support for Criterion (a)(1) components
Supports for EDG, HVAC System Components, and Other Miscellaneous Equipment	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for Non-ASME Piping & Components	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.14 Machine Shop

Description

The Machine Shop is a two story structural steel and sheet metal building adjacent to the TB, Control Complex, and AB on the west side, the Diesel Generator Building on the south side, and the Ready Warehouse on the east side.

The Machine Shop is a Class III structure. Calculations have indicated that for Class III structures the wind imposes greater load than does an earthquake loading such that seismic loads need not be considered. As such, there are no seismic interaction issues. The Machine Shop contains components required to support regulated events associated with Fire Protection. An Appendix R chiller is supported on the roof of the Machine Shop. The chiller is credited for Control Complex cooling if a fire should disable the normal HVAC cooling in the Control Complex. The support steel for the chiller and associated electrical conduit, panels, and enclosures are included in the scope of License Renewal. The supports for the fire protection piping inside the Machine Shop, and a fire door located in the common wall between the Machine Shop and the Auxiliary Building are also included in the scope of License Renewal.

The scoping review for the Machine Shop excluded the building structure itself from the scope of License Renewal based on the guidance in NEI 95-10 which states:

> Consideration of hypothetical failures that could result from system interdependencies, that are not part of the current licensing bases and that have not been previously experienced is not required.

Based on this, the Machine Shop structural steel, concrete, siding, roof etc has been considered to be a second level support system that is not required for License Renewal.

Based on the results of the CR-3 scoping and screening review, the Machine Shop performs the following intended functions:

C-4	Fire Barrier
C-7	Structural Support for Criterion (a)(2) and (a)(3) components

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

1. SCs that are relied on during postulated fires.

FSAR and Drawing References

The Machine Shop is not described in the CR-3 FSAR; however, its location is shown on Figure 2.2-1.

Components Subject to Aging Management Review

The table below identifies the Machine Shop components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-15: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Machine Shop.

TABLE 2.4.2-14 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: MACHINE SHOP

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Cable Tray, Conduit, HVAC Ducts, Tube Track (associated with the Appendix R Chilled Water System)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Door	C-4 Fire Barrier
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (associated with the Appendix R Chilled Water System)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for EDG, HVAC System Components, and Other Miscellaneous Equipment (associated with the Appendix R Chilled Water System)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for Non-ASME Piping & Components (associated with Fire Service piping)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.15 Miscellaneous Structures

Description

Miscellaneous Structures are stand alone structures that are not part of, or attached to, the major building systems located inside the protected area of CR-3. Miscellaneous Structures within the scope of License Renewal are listed below.

Condensate Storage Tank Foundation

The Condensate Storage Tank Foundation is a reinforced concrete mat foundation with oiled sand under the tank bottom. The tank is anchored to the reinforced concrete foundation with anchor chairs and embedded bolts. The tank is adjacent to the west side of the TB. The Condensate Storage Tank is categorized as a non-safety related, seismic Class I component. The tank is within the scope of License Renewal, because it provides a backup supply of water to the EFW System, provides a fire protection function, and is credited in the mitigation of a steam generator tube rupture event. The applicable License Renewal Intended Function is:

C-7	Structural Support for Criterion (a)(2) and (a)(3) components

Hydrazine Addition Tank Foundation

The Hydrazine Addition Tank is a small tank located outside the TB adjacent to the Condensate Storage Tank. The tank is supported by four legs that are anchored to a concrete foundation. The Hydrazine Addition Tank is not adjacent to any Class I structure and is, therefore, not a seismic interaction concern. The topical calculation for non-safety affecting safety identified the tank as required to support a design basis event. As such, the Hydrazine Addition Tank Foundation is within the scope of License Renewal. The applicable License Renewal Intended Function is:

C-7	Structural Support for Criterion (a)(2) and (a)(3) components

Fire Service Water Tank Foundations

The foundations for Fire Service Water Tanks are reinforced concrete ring foundations with oiled sand under the tank bottoms. The tanks are not anchored to the ring foundations. The Fire Service Water Tank foundations are categorized as Class III structures. Calculations have indicated that for Class III structures the wind imposes greater load than does an earthquake loading such that seismic loads need not be considered. Therefore, there are no seismic interaction concerns. The Fire Service Water Tanks are categorized in PassPort EDB as supporting the regulated event associated with fire protection and are therefore within the scope of License Renewal. The applicable License Renewal Intended Function is:

C-7	Structural Support for Criterion (a)(2) and (a)(3) components

Buried Fuel Oil Tank Foundation and Vent Pipes

Two underground diesel fuel oil storage tanks for the Emergency Diesel Generator are located south of the Diesel Generator Building. The tanks are supported on concrete saddles and secured with metal bands. The steel metal bands have been coated with coal tar epoxy equivalent to Bitumastic 300M coating. Four vent pipes, raised above the maximum flood level, are included with this structure. The applicable License Renewal Civil Intended Functions are:

C-2	Structural Support for Criterion (a)(1) components
C-6	Missile Barrier

Manholes and Duct Banks

Manholes and Duct Banks are located throughout the plant outside areas. Manholes are typically constructed of reinforced concrete, located below grade, and covered with either a concrete or carbon steel hatch cover. Duct banks typically consist of electrical conduits surrounded by concrete and are located below grade. Manholes and Duct Banks support a License Renewal intended function based on review of PassPort EDB quality classifications and are within the scope of License Renewal. Manholes in scope for License Renewal are:

1. Plant Outside Areas: E1, E2, E3
2. Hot Machine Shop: E7
3. Discharge Canal (Cable Bridge, East): SB1, SB2

The applicable License Renewal Civil Intended Function is:

C-7	Structural Support for Criterion (a)(2) and (a)(3) components

Concrete Flood Barriers

A protective concrete flood barrier wall is provided in various locations around plant structures to provide flood protection from grade elevation to elevation 129 ft. This protective barrier is described in detail in Section 2.4.2.4 of the FSAR and includes concrete plugs, monorails, water-tight doors, and elastomeric seals required to fulfill a flood barrier function. The non-safety affecting safety topical evaluation specifically credits the Concrete Flood Barriers; therefore, they are within the scope of License Renewal. The applicable License Renewal Intended Function is:

C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-8	Flood Barrier

Instrument Air Equipment Foundation

The Instrument Air Equipment Foundation is located in the northeast corner of the plant adjacent to the TB and Main Transformers. The Instrument Air Equipment includes evaporator coolers, a mobile diesel-driven air compressor, a mobile fuel tank, and various chemical injection pumps and associated components. The subject components are supported on a concrete pad. The Instrument Air Equipment Foundation is not adjacent to any Class I structures; thus, there are no seismic interaction concerns. The Instrument Air Equipment Foundation is within the scope of License Renewal based on PassPort EDB quality classifications. The applicable License Renewal Intended Function is:

C-7	Structural Support for Criterion (a)(2) and (a)(3) components

Fire Hose Stations

Fire Hose Stations are located around the perimeter of the CR-3 yard and are contained in numbered sheet metal sheds. The Fire Hose Stations are not adjacent to any Class I structures; therefore, there are no seismic interaction concerns. The Fire Hose Stations have been credited by the Fire Protection Program with functions required to support the requirements of 10 CFR 50.48. Therefore, they are within the scope of License Renewal. The applicable License Renewal Intended Function is:

C-7	Structural Support for Criterion (a)(2) and (a)(3) components

Offsite Power Termination Enclosure

A small sheet metal structure, identified as the Offsite Power Termination (OPT) Enclosure in PassPort EDB, is located on the west side of the plant on the Wave Embankment Protection Structure near the Fire Service Water Tanks. The structure is a sheet metal building supported on a concrete foundation. The OPT Enclosure is not adjacent to any Class I structures, so there are no seismic interaction concerns. The topical evaluation for SBO identified this structure as supporting SBO recovery. Therefore, the OPT Enclosure is within the scope of License Renewal with License Renewal Intended Function:

C-7	Structural Support for Criterion (a)(2) and (a)(3) components

Fire Protection Header Supports

A short section of Fire Protection (FP) piping is routed above ground from the Fire Service Pump House around the RB Maintenance Support Building and the EFW Tank Enclosure on short concrete pedestals. The FP piping is credited as within the scope of License Renewal for support of a FP function. Therefore, the concrete supports are within the scope of License Renewal. The applicable License Renewal Intended Function is:

C-7	Structural Support for Criterion (a)(2) and (a)(3) components

Transformer Enclosures

The Transformer Enclosures associated with the Unit Auxiliary, Startup, and Backup Engineered Safeguards Transformers are within the scope of License Renewal because they are credited for FP Appendix R safe shutdown. The Backup Engineered Safeguards Transformer (BEST) is also required for compliance with the SBO regulated event. The Transformer Enclosures include the concrete flame impingement walls between transformers, as well as, the concrete foundations for the transformers themselves. The Transformer Enclosures are not adjacent to any Class I structures; thus, there are no seismic interaction concerns. Note that the supports for in-scope fire suppression piping in the vicinity of the above transformers and the Main Transformers are in the scope of License Renewal. The Transformer Enclosures are within the scope of License Renewal, and the applicable License Renewal Civil Intended Function is:

C-7	Structural Support for Criterion (a)(2) and (a)(3) components

Miscellaneous Pipe Supports

The various topical evaluations addressing regulated events have identified the following systems as having a piping commodity within the scope of License Renewal and located in the Miscellaneous Structures:

1. Auxiliary Steam,
2. Condensate,
3. Fuel Oil,
4. Decay Heat Removal,
5. Domestic Water,
6. Emergency Feedwater,
7. Fire Protection,
8. Instrument Air,
9. Leak Rate Test,
10. Station Air,
11. Station Drains,
12. RB Airlock, and
13. Nuclear Service and Decay Heat Sea Water.

Pipe supports for piping within the subject systems located within the boundaries of the Miscellaneous Structures are therefore within the scope of License Renewal. The applicable License Renewal Intended Functions are:

C-2	Structural Support for Criterion (a)(1) components
C-7	Structural Support for Criterion (a)(2) and (a)(3) components

Based on the results of the CR-3 scoping and screening review, the Miscellaneous Structures perform various License Renewal intended functions: These functions are identified in the description of individual in-scope structures above.

The Miscellaneous Structures are in the scope of License Renewal because they contain:

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

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

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

FSAR and Drawing References

In general, the Miscellaneous Structures are not described in the CR-3 FSAR. The Concrete Flood Barriers are shown on FSAR Figure 2-30. Most of the in-scope Miscellaneous Structures are shown on Figure 2.2-1.

Components Subject to Aging Management Review

The table below identifies the Miscellaneous Structures components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in
Table 3.5.2-16: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Miscellaneous Structures.

TABLE 2.4.2-15 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: MISCELLANEOUS STRUCTURES

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Anchorage/Embedment	C-2 Structural Support for Criterion (a)(1) components C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Above Grade	C-2 Structural Support for Criterion (a)(1) components C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier
Concrete Below Grade	C-2 Structural Support for Criterion (a)(1) components C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Foundation	C-2 Structural Support for Criterion (a)(1) components C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components

TABLE 2.4.2-15 (continued) COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: MISCELLANEOUS STRUCTURES

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Door (Non-Fire)	C-8 Flood Barrier
Fire Hose Stations	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures	C-2 Structural Support for Criterion (a)(1) components C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Seals and Gaskets	C-8 Flood Barrier
Steel Components: All Structural Steel	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for Non-ASME Piping & Components	components C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.16 Switchyard for Crystal River Site

Description

The Switchyard for the Crystal River Site is a Class II structure important to reactor operation but not essential for safe shutdown of the reactor. The purpose of the Switchyard is to connect the power generated by CR-3 to the Progress Energy system for distribution to its customers. Additionally, the Switchyard provides a reliable source of offsite power when recovering from an SBO event.

The Switchyard for the Crystal River Site is located outside of and approximately 300 yards north of the protected area. It is an outside area, open to the environment, separated into a 230KV service area and a 500KV service area. Each service area is provided with a Switchyard Relay Building and a Terminal House. Concrete foundations and support structures have been provided for SBO components.

The Switchyard 230KV service area is credited with a License Renewal intended function because it contains the Offsite Power Transformer (OPT) and associated cable trenches that provide the first source of offsite power for SBO recovery. The first isolation devices upstream of the OPT are the plant line breakers 4900 and 4902. These breakers are also located in the Switchyard 230KV service area. The source of DC control power for plant line breakers is provided from Class 1E batteries located in the CR-3 plant. The in-scope components for the first source of offsite power for SBO recovery include prefabricated fiber reinforced trenching with covers for underground cables that provide DC control power from the CR-3 plant batteries to the 500KV Switchyard Relay Building and the 4900 and 4902 plant line breakers. There is a

500KV Terminal House at the east Cable Bridge on the north side of the Discharge Canal through which the DC control power cable is routed. The 500KV Switchyard Relay Building is part of the Switchyard Relay Building structure discussed in Subsection 2.4.2.17.

The second source of offsite power for SBO recovery is obtained through the Backup Engineered Safeguards Transformer (BEST). The BEST is situated at the north end of the TB next to the Start-up Transformer. The SBO boundary includes the overhead transmission conductors from the BEST to the first overhead tower support located in the 230KV Switchyard. The first isolation devices upstream of the BEST are 230KV plant line breakers 1691 and 1692. These breakers are located in the 230KV Switchyard service area. The source of DC control power for the breakers is provided from batteries located at Crystal River Units 1 and 2. The 230KV Terminal House supports the DC control power cables for breakers 1691 and 1692. The in scope components for the second source of offsite power for SBO recovery include the CR-1 and CR-2 battery rooms, and battery support structures, panels and support structures, conduit/cable tray and supports in CR-1 and CR-2, and conduits, trenches, and associated components in the Switchyard.

Refer to Figure 2.4-1 for a sketch of the SBO-related structures in the Switchyard that are in scope for License Renewal.

Based on the results of the CR-3 scoping and screening review, the Switchyard for Crystal River Site performs the following intended function:

C-7	Structural Support for Criterion (a)(2) and (a)(3) components

The Switchyard for Crystal River Site is in the scope of License Renewal because it contains:

1. SCs that are relied on during postulated station blackout events.

FSAR and Drawing References

The Switchyard for Crystal River Site is not described in the CR-3 FSAR. FSAR Figure 8-1 shows the 230KV and 500KV distribution circuits. Portions of the Switchyard are shown on Figure 2.2-1 and Figure 2.4-1.

Components Subject to Aging Management Review

The table below identifies the Switchyard for Crystal River Site components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-17: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Switchyard for Crystal River Site

TABLE 2.4.2-16 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: SWITCHYARD FOR CRYSTAL RIVER SITE

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Anchorage/Embedment	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Battery Rack	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Above Grade	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Below Grade	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Foundation	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Steel Components: All Structural Steel	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.17 Switchyard Relay Building

Description

The Switchyard Relay Building provides power and controls for components in the Switchyard. The Switchyard System consists of a 230KV service area and a 500KV service area (Refer to Subsection 2.4.2.16). Each service area is provided with a Switchyard Relay Building and a Terminal House. The Switchyard Relay Building structures consist of the 500KV Switchyard Relay Building, 230KV Terminal House, and the 500KV Terminal House. However, the 230KV Switchyard Relay Building is not credited with any License Renewal intended functions and, therefore, is not in the scope of License Renewal.

The 230KV Terminal House, located at the north end of the west Cable Bridge, contains the DC power distribution panels for breakers 1691 and 1692 that are required for recovering from an SBO event.

The 500KV Switchyard Relay Building contains the DC power distribution panel for plant line breakers 4900 and 4902 that are credited for restoration of offsite power when recovering from an SBO event. DC power to the 500KV Switchyard Relay Building is provided from CR-3 and is transmitted through underground cables and through a 500KV Terminal House located to the north of the east Cable Bridge. The 500KV Switchyard Relay Building is a single story concrete block structure with precast fiber roof panels on bar joists. Pre-fabricated fiber reinforced trenching with covers, which are part of the Switchyard structure, are routed from the 500KV Switchyard Relay Building to various Switchyard components associated with the plant line breakers.

Based on the results of the CR-3 scoping and screening review, the Switchyard Relay Building performs the following intended function:

C-7	Structural Support for Criterion (a)(2) and (a)(3) components

The Switchyard Relay Building is in the scope of License Renewal because it contains:

1. SCs that are relied on during postulated station blackout events.

FSAR and Drawing References

The Switchyard Relay Building is not described in the CR-3 FSAR. However, the Switchyard Relay Building structures are shown on Figure 2.4-1.

Components Subject to Aging Management Review

The table below identifies the Switchyard Relay Building components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-18: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Switchyard Relay Building.

TABLE 2.4.2-17 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: SWITCHYARD RELAY BUILDING

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Anchorage/Embedment	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Above Grade	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Below Grade	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Foundation	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Door (Non-Fire)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Masonry Walls	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Roof-Membrane/Built-up	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Steel Components: All Structural Steel	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.18 Turbine Building

Description

The Turbine Building (TB) has a reinforced concrete foundation mat at elevation 95 ft. and an operating floor at elevation 145 ft. A concrete turbine pedestal is the central dominant structural feature of the building. A structural steel superstructure, supported from the foundation, provides the support structure for the external walls and roof. The TB external walls are a combination of concrete or sheet metal siding. Internal steel platforms are provided. The TB is founded on concrete fill overlying cement-grouted limerock. The TB is a Class III structure and is protected from flooding by flood walls and water tight doors at openings up to elevation 129 ft.

The License Renewal TB structure also includes the Heater Bay. The TB shelters and supports many systems and components including the following:

1. Feedwater System components,
2. Main Steam System components,
3. Main Condenser,
4. Main Turbine,
5. Turbine Generator,
6. Electrical switchgear, and
7. A 180-ton overhead crane.

The TB is adjacent to the Intermediate Building and the Control Complex.

Based on the results of the CR-3 scoping and screening review, the TB performs the following intended functions:

C-4	Fire Barrier
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-8	Flood Barrier
C-11	Pipe Whip Restraint/HELB Shielding

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

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

2. SCs that are relied on during postulated fires, anticipated transients without scram, and station blackout events, and

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

FSAR and Drawing References

The TB is mentioned in the FSAR Section 2.4.2.4. The TB is shown on FSAR Figures 1-4, 1-6, 1-9, and 1-10. The TB and other major in-scope structures are shown on Figure 2.2-1.

Components Subject to Aging Management Review

The table below identifies the TB components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-19: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Turbine Building.

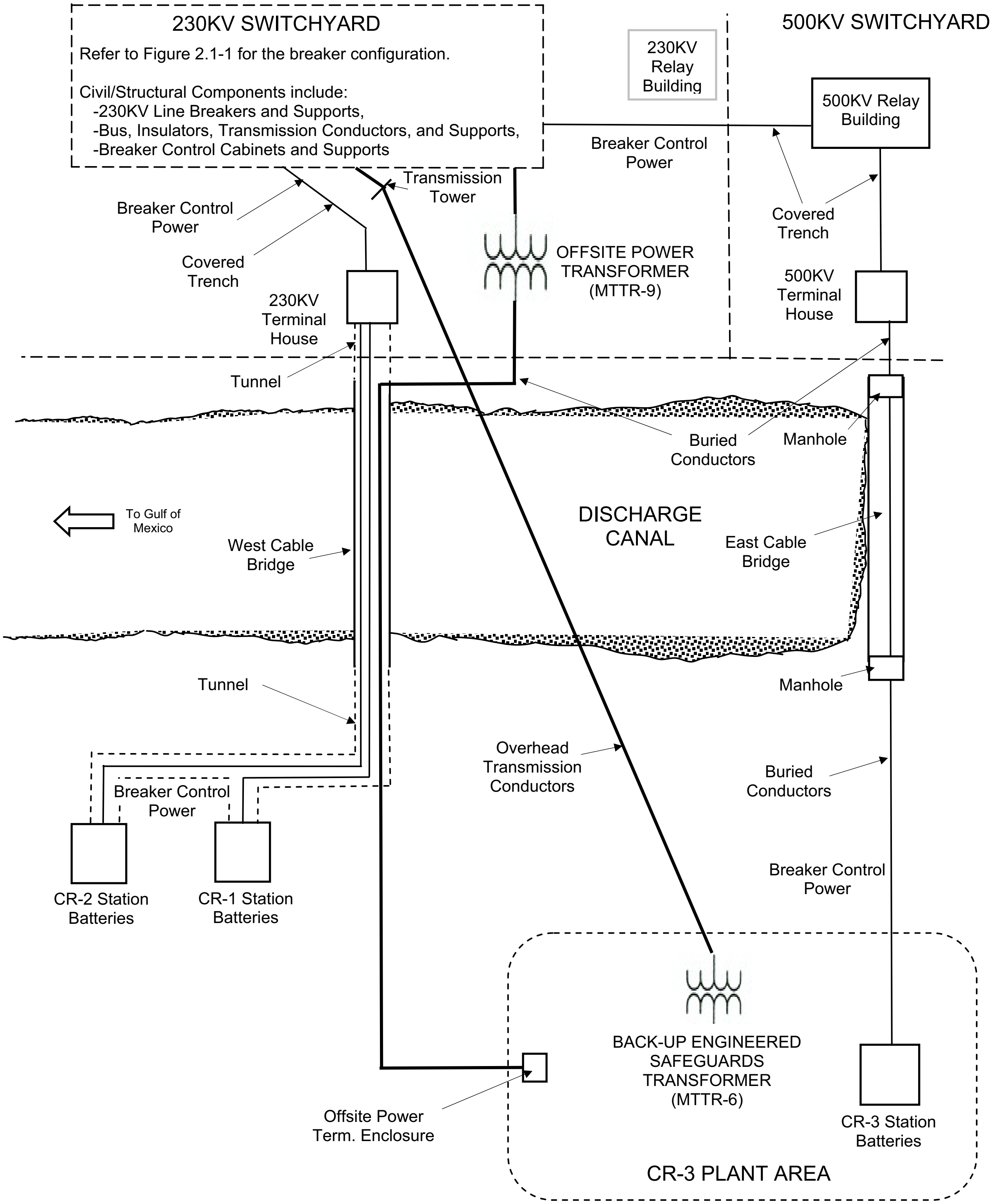
TABLE 2.4.2-18 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: TURBINE BUILDING

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Anchorage/Embedment	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Battery Rack	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete Above Grade	C-4 Fire Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier
Concrete Below Grade	C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier
Concrete Foundation	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Damper Mountings	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Door (Non-Fire)	C-3 Shelter, Protection C-8 Flood Barrier
Door	C-4 Fire Barrier
Fire Barrier Penetration Seals	C-4 Fire Barrier
Fire Hose Stations	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Floor Drains	C-8 Flood Barrier
Masonry Walls	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Phase Bus Duct Enclosure Assemblies	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures	C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier C-11 Pipe Whip Restraint/HELB Shielding
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Roof-Membrane/Built-up	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

TABLE 2.4.2-18 (continued) COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: TURBINE BUILDING

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Seals and Gaskets	C-8 Flood Barrier
Siding	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Steel Components: All Structural Steel	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for EDG, HVAC System Components, and Other Miscellaneous Equipment	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for Non-ASME Piping & Components	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

FIGURE 2.4-1 STRUCTURES USED FOR STATION BLACKOUT RECOVERY



[This page intentionally blank]

2.5 SCOPING AND SCREENING RESULTS – ELECTRICAL AND INSTRUMENTATION AND CONTROLS (I&C) SYSTEMS

The determination of electrical/I&C systems within the scope of License Renewal is made through the application of the process described in Subsection 2.1.1. The results of the electrical/I&C systems scoping review are contained in Section 2.2.

The methodology used to identify electrical/I&C components requiring an aging management review (AMR) is discussed in Subsection 2.1.2.3. The screening for electrical/I&C components was performed on generic component types for the in-scope electrical/I&C systems listed in Table 2.2-3, as well as the electrical/I&C component types associated with in-scope mechanical systems and civil structures listed in Tables 2.2-1 and 2.2-2. The commodity groups are discussed in the following Subsection.

2.5.1 ELECTRICAL/I&C COMPONENT COMMODITY GROUPS

The screening process for electrical/I&C components involves using plant documentation to identify the different types of electrical equipment and components located in the systems and structures that are within the scope of License Renewal. Electrical/I&C component types were identified by use of PassPort EDB, the EPRI License Renewal Electrical Handbook, and plant documentation such as electrical diagrams, process and instrumentation drawings, vendor technical manuals, and plant modification packages. The component types identified were organized into commodity groups; the electrical/I&C component commodity groups identified at CR-3 are listed in the following table. This table includes all electrical and I&C component commodity groups listed in Table 2.1-5 of NUREG-1800, “Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants,” Rev. 1, U. S. Nuclear Regulatory Commission, September 2005, (hereinafter referred to as NUREG-1800 or SRP-LR).

Electrical cable tie-wraps are not included as a commodity on the following table; however, recent License Renewal applicants have been asked by NRC staff reviewers whether tie-wraps are in scope of License Renewal. Therefore, a review was performed to determine whether cable tie-wraps meet the scoping criteria of 10 CFR 54.4. At CR-3, electrical cable tie-wraps serve to train the cables to provide a neat and orderly installation. Tie-wraps are also used as an aid during cable installation to establish power cable spacing in cable trays. The tie-wraps do not function as cable supports, and seismic qualification of cable trays does not credit the use of electrical cable tie-wraps. In addition, the potential effect on safety-related equipment caused by the failure of plastic cable tie-wraps due to age-related degradation was considered; and it was concluded that the failure of tie-wraps that could prevent satisfactory accomplishment of the functions of the structure, systems, and components identified under 10 CFR 54.4(a)(1) is not credible. Furthermore, a review of CR-3 operating experience identified no equipment failures attributable to failure of cable tie-wraps. Therefore, the CR-3 cable tie-wraps do not meet the scoping criteria of 10 CFR 54.4.

ELECTRICAL/I&C COMPONENT COMMODITY GROUPS INSTALLED IN IN-SCOPE SYSTEMS AND STRUCTURES AT CR-3			
Alarm Units	Electrical portions of Electrical/I&C Penetration Assemblies	Light Bulbs	Solenoid Operators
Analyzers		Load Centers	Signal Conditioners
		Loop Controllers	Solid-State Devices
Annunciators	Elements	Meters	Splices
Batteries	Fuses	Motor Control Centers (Note 2)	Surge Arrestors (Note 4)
Metal enclosed bus (Note 1)	Generators	Motors	Switches
Chargers	Heat Tracing	Power Distribution Panels	Switchgear (Note 2)
Circuit Breakers	Heaters	Power Supplies	Switchyard Bus
Converters	High-voltage Insulators	Radiation Monitors	Terminal Blocks
Communication Equipment	Indicators	Recorders	Thermocouples
	Cables and Connections (Note 3)	Regulators	Transducers
Electrical Controls and Panel Internal Component Assemblies (Note 2)		Relays	Transformers
	Inverters	RTDs	Transmitters
	Isolators	Sensors	Transmission Conductors

Notes:

1. The term "phase bus" has been changed to "metal enclosed bus" to conform to the terminology in Section 3.6 of NUREG-1800.

2. Cable tray, conduit, racks, panels, cabinets, and enclosures for electrical equipment and instrumentation, such as Motor Control Centers and Switchgear that enclose and support electrical components, are civil commodities and are addressed in Section 2.4.

3. Uninsulated ground conductors are electrical conductors (e.g., copper cable, copper bar, steel bar) that are bare conductors. Uninsulated ground conductors provide a common electrical ground reference for electrical and electronic equipment and enhance the capability of the electrical system to withstand electrical system disturbances (e.g., electrical faults, lightning surges) for equipment and personnel protection. Uninsulated ground conductors do not include instrument or computer grounding conductors, since these grounding conductors are insulated. Being insulated, they are included with the insulated cables and connections commodity group. A review of the uninsulated ground conductor functions was performed, and it was concluded that they do not perform or support any safety-related functions or any of the functions identified in 10 CFR 54.4(a). Uninsulated ground conductors are not relied on to remain functional during or following any design basis event. There are no failures of uninsulated ground conductors that could prevent satisfactory accomplishment of any of the License Renewal intended functions. Therefore, since uninsulated ground conductors do not support a system level intended function, they are not within the scope of License Renewal.

4. Lightning arrestors are considered part of the “surge arrestors” commodity group. A review of the lightning protection support function was performed, and it was concluded that lightning arrestors do not perform or support any safety-related functions or any of the functions identified in 10 CFR 54.4(a). Lightning arresters are not relied on to remain functional during or following any design basis event. There are no failures of lightning arresters that could prevent satisfactory accomplishment of any of the License Renewal intended functions. Therefore, since lightning arresters do not support a system level intended function, they are not within the scope of License Renewal.

2.5.2 APPLICATION OF SCREENING CRITERION 10 CFR 54.21(a)(1)(i) TO ELECTRICAL/I&C COMPONENT COMMODITY GROUPS

Following the identification of the electrical/I&C component commodity groups, the criteria of 10 CFR 54.21(a)(1)(i) were applied to identify component commodity groups that perform their intended functions without moving parts or without a change in configuration or properties.

The following electrical/I&C component commodity groups were determined to meet the screening criteria of 10 CFR 54.21(a)(1)(i):

1. Insulated Cables and Connections,

   Connections include splices, connectors, fuse holders and terminal blocks.

2. Electrical portions of Electrical/I&C Penetration Assemblies,

   Penetration Assemblies include electrical penetration assemblies and conduit seal assemblies

3. Metal Enclosed Bus (MEB),

4. High-voltage Insulators,

5. Switchyard Bus, and

6. Transmission Conductors.

2.5.3 APPLICATION OF SCREENING CRITERION 10 CFR 54.21(a)(1)(ii) TO ELECTRICAL/I&C COMPONENT COMMODITY GROUPS

The 10 CFR 54.21(a)(1)(ii) screening criterion was applied to the specific component commodity groups that remained following application of the 10 CFR 54.21(a)(1)(i) criterion. 10 CFR 54.21(a)(1)(ii) allows the exclusion of those component commodity groups that are subject to replacement based on a qualified life or specified time period. The only electrical/I&C components identified for exclusion by the criteria of §54.21(a)(1)(ii) are electrical components included in the CR-3 Environmental Qualification (EQ) Program. This is because electrical components included in the EQ Program have defined qualified lives and are replaced prior to the expiration of their qualified lives. No electrical/I&C components within the CR-3 EQ Program are subject to AMR in accordance with the screening criteria of §54.21(a)(1)(ii); however, Electrical/I&C Penetration Assemblies in the CR-3 EQ Program may be subject to AMR if they perform a civil/structural intended function for maintaining a pressure boundary.

Based on the review of commodities that are subject to replacement based on a qualified life or specified time period several non-EQ Program commodities have been determined to be subject to AMR; these are discussed below.

2.5.4 DETAILED SCREENING RESULTS

2.5.4.1 Non-EQ Insulated Cables and Connections

An insulated cable is an assembly of an electrical conductor (e.g., wire) with an insulation covering or a combination of conductors insulated from one another with overall coverings. Connections or terminations are used to connect the cable conductors to other cables or electrical devices. Connections include connectors, splices, and terminal blocks. Fuse holders are considered to be a type of electrical connection similar to a terminal block. Insulated cables and connections inside the enclosure of an active device (e.g., motor leads and connections, and cables and connections internal to relays, battery chargers, switchgear, transformers, power supplies, etc.) are maintained along with the other subcomponents and piece-parts inside the enclosure and are not included in the Non-EQ Insulated Cables and Connections commodity group.

Because of the complexity of determining whether individual insulated cables support a license renewal intended function, all non-EQ insulated cable and connections were conservatively screened as subject to AMR. However, individual circuits were subject to elimination from scope on a case-by-case basis during the AMR evaluation process based on a more detailed evaluation of their intended functions.

A review of CR-3 fuse holders was performed using criteria specified in NUREG-1801 to identify fuse holders that require AMR. The review eliminated fuse holders that were part of a larger (active) assembly; the remaining fuse holders are subject to AMR.

2.5.4.2 Electrical Portions of Non-EQ Electrical/I&C Penetration Assemblies

Electrical penetration assemblies consist of one or more electrical conductors and a pressure boundary between the inboard and outboard sides of the penetration capable of maintaining electrical continuity through the boundary. The non-EQ Electrical/I&C Penetration Assemblies within the scope of this review include non-EQ Conax penetration assemblies and non-EQ Namco conduit seal assemblies. The Reactor Building pressure boundary function of Conax electrical penetrations is addressed in Section 2.4 as a civil/structural intended function. As noted in Subsections 2.5.2 above, the electrical portions of Electrical/I&C Penetration Assemblies perform their intended functions without moving parts or without a change in configuration or properties. In addition, as noted in Subsection 2.5.3, those not covered by the EQ Program are not excluded from an AMR based on a qualified life or specified time period for replacement or refurbishment. Therefore, the electrical portions of Non-EQ Electrical/I&C Penetration Assemblies are subject to an AMR.

2.5.4.3 Metal Enclosed Bus and Connections

Metal Enclosed Bus and associated connections are used to connect two or more elements of an electrical circuit, e.g., electrical equipment such as switchgear. The Metal Enclosed Bus (MEB) and Connections commodity group includes non-segregated 4.16KVAC and non-segregated 250/125VDC MEB. Non-segregated bus is electrical bus constructed with all phase conductors in a common enclosure with only an air space between the phases. Electrical bus and connections inside a generator, transformer, or switchgear enclosure are inspected and maintained along with other subcomponents and piece-parts inside the enclosure and are not included in this review. MEB enclosure assemblies and associated structural supports are addressed in Section 2.4 as civil/structural commodities within the structures that house them.

The Metal Enclosed Bus and Connections that are within the scope of License Renewal are provided in the following table. The CR-3 iso-phase bus is not within the scope of License Renewal because it performs no intended functions for License Renewal.

Type	Description
Non-segregated, 6.9KV [1]	Connects power to Reactor Coolant Pump Transformer Cabinet, RCTR-3
Non-segregated, 6.9KV [1]	Connects power to Reactor Coolant Pump Transformer Cabinet, RCTR-4
Non-segregated, 4.16KV [2]	Connects Unit Auxiliary Transformer to Unit Switchgear
Non-segregated, 4.16KV [2]	Connects Unit Switchgear to Engineered Safeguards Switchgear 3B, South Section
Non-segregated, 4.16KV [2]	Crosstie connecting Unit Switchgear to Engineered Safeguards Switchgear, North Sections
Non-segregated, 4.16KV [2]	Connects Engineered Safeguards Switchgear 3A, South Section, to Engineered Safeguards Bus 3B, South Section
Non-segregated, 4.16KV [2]	Connects Engineered Safeguards Switchgear 3A, North & South Sections
Non-segregated, 4.16KV [2]	Connects Engineered Safeguards Switchgear 3B, North & South Sections
Non-segregated, 250/125VDC	Connects Main Panel 3A to Disconnect Switch DPDS-1A
Non-segregated, 250/125VDC	Connects Main Panel 3B to Disconnect Switch DPDS-1B

Notes:

1. The 6.9KV MEB is connected to Reactor Coolant Pump transformer cabinets and is in scope for seismic considerations only. The 6.9KV MEB does not support an electrical intended function for License Renewal.

2. The 4.16KV MEB provides a function associated with Station Blackout (SBO) recovery.

2.5.4.4 High Voltage Insulators

High voltage insulators are provided on the circuits used to supply power from the switchyard to plant buses. The function of high voltage insulators is to insulate and support electrical conductors. There are two basic types of insulators installed at CR-3: station post insulators and strain or suspension insulators. Station post insulators are used to support stationary switchyard equipment such as disconnect switches and bus. Strain and suspension insulators are used to maintain tensional support for a transmission conductor between transmission towers or other supporting structures. Station post and strain and suspension insulators are supported from a structure such as a transmission tower or support pedestal.

High voltage insulators are passive, long-lived components. Therefore, high voltage insulators meet the criteria of 10 CFR 54.21(a)(1) and are subject to an AMR. The in-scope high-voltage insulators are located in the power paths from the 230KV Switchyard to the plant to supply power from the switchyard to plant buses during recovery from an SBO. The offsite power paths for recovery from an SBO event are shown schematically on Figure 2.1-1.

2.5.4.5 Switchyard Bus and Connections

Switchyard bus is uninsulated, unenclosed, rigid electrical conductor used to electrically connect various elements in the switchyard such as disconnect switches and flexible transmission conductors. This scope of review of switchyard bus includes the switchyard bus and the hardware used to secure the bus to the station post insulators that support the bus. Switchyard bus connections to a disconnect switch are inspected and maintained along with the disconnect switch and, therefore, are not included in the AMR.

Switchyard Bus and Connections are passive, long-lived components. Therefore, they meet the criteria of 10 CFR 54.21(a)(1) and are subject to an AMR. Switchyard bus provides a portion of the circuits supplying power from the switchyard to plant buses during recovery from an SBO. The offsite power paths for recovery from an SBO event are shown schematically on Figure 2.1-1.

2.5.4.6 Transmission Conductors and Connections

Transmission conductors are uninsulated, stranded electrical cables used to electrically connect various elements in the switchyard, such as power circuit breakers, transformers and rigid switchyard bus. The transmission conductors are insulated from their support structures by strain or suspension insulators. The transmission conductors are secured to the insulators with specifically designed metal hardware. The review of transmission conductors includes the transmission conductors and the hardware used to secure the conductors to the high-voltage insulators and electrically connect the conductors to the switchyard bus and the main power transformers.

Transmission conductors are passive, long-lived components. Therefore, transmission conductors meet the criteria of 10 CFR 54.21(a)(1) and are subject to an AMR. Transmission conductors provide a portion of the circuits used to supply power from the switchyard to plant buses during recovery from an SBO. The offsite power paths for recovery from an SBO event are shown schematically on Figure 2.1-1.

2.5.5 ELECTRICAL/I&C COMPONENTS REQUIRING AN AGING MANAGEMENT REVIEW

The table below identifies the Electrical/I&C component commodity groups requiring an AMR and their intended functions. The AMR results for these components/commodities are provided in Table 3.6.2-1: Electrical and I&C Systems - Summary of Aging Management Evaluation – Electrical and I&C Systems.

TABLE 2.5-1 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: ELECTRICAL AND I&C SYSTEMS

Component/Commodity	Intended Function(s) (See Table 2.1-1 for function definitions)
Non-EQ Insulated Cables and Connections [1]	E-1 Electrical Continuity
Electrical Portions of Non-EQ Electrical/I&C Penetration Assemblies	E-1 Electrical Continuity
Metal Enclosed Bus and Connections	E-1 Electrical Continuity E-2 Electrical Insulation [2]
High-Voltage Insulators [3]	E-2 Electrical Insulation
Switchyard Bus and Connections [3]	E-1 Electrical Continuity
Transmission Conductors and Connections [3]	E-1 Electrical Continuity

Notes:

1. Connections include splices, connectors, terminal blocks, and fuse holders. Fuse holders are considered to be another type of electrical connection similar to a terminal block and are, therefore, subject to aging management review.

2. This intended function applies to the following parts of this commodity group: bus insulation and bus insulators.

3. This commodity group is credited in the restoration of offsite power when recovering from an SBO event.

[This page intentionally blank]

3.0 AGING MANAGEMENT REVIEW RESULTS

For those structures and components that are identified as being subject to an aging management review (AMR), 10 CFR 54.21(a)(3) requires demonstration that the effects of aging will be adequately managed so that their intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation.

This chapter describes the results of the AMR of structures and components determined, during the scoping and screening processes, to be subject to an AMR. Organization of this chapter is based on Tables 1 through 6 of Volume 1 of NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," Revision 1, dated September 2005 (the GALL Report), and Chapter 3, “Aging Management Review Results,” of NUREG-1800, "Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants (SRP-LR)," Revision 1, dated September 2005. The major sections of this Chapter are:

3.1 Aging Management of Reactor Vessel, Internals, and Reactor Coolant System

3.2 Aging Management of Engineered Safety Features

3.3 Aging Management of Auxiliary Systems

3.4 Aging Management of Steam and Power Conversion Systems

3.5 Aging Management of Containments, Structures, and Component Supports

3.6 Aging Management of Electrical and Instrumentation and Controls

Most of the AMR results information in Chapter 3 is presented in two tables of the following types:

Table 3.x.1 – where ‘3’ indicates LRA Chapter 3; ‘x’ indicates the section number; and ‘1’ indicates the first table type. For example, in the Reactor Vessel, Internals, and Reactor Coolant System section this table would be numbered 3.1.1 and in the Auxiliary Systems section, this table would be numbered 3.3.1. This table will typically be referred to as “Table 1.”

Table 3.x.2-y – where ‘3’ indicates LRA Chapter 3; ‘x’ indicates the section number; ‘2’ indicates the second table type; and ‘y’ indicates the specific system being addressed. For example, within Section 3.1 for the Reactor Vessel, Internals, and Reactor Coolant System, the table number for the Reactor Coolant System would be 3.1.2-1; and for the Control Rod Drive Control System, 3.1.2-2. Also, within Section 3.2 for Engineered Safety Features Systems, this table would be 3.2.2-1, for the Reactor Building Spray

System; and the next system would have a table 3.2.2-2. This table will typically be referred to as “Table 2" for the specific system.

Table Descriptions

NUREG-1801, the GALL Report, contains the NRC staff’s generic evaluation of existing plant programs. It documents the technical basis for determining where existing programs are adequate without modification, and where existing programs should be augmented for the period of extended operation. The evaluation results documented in the report indicate that many of the existing programs are adequate to manage the aging effects for particular structures or components. The GALL Report also contains recommendations on the specific areas for which an existing program should be augmented for license renewal. In order to take full advantage of NUREG-1801, a comparison between the AMR results and the tables of NUREG-1801 has been made. The results of that comparison are provided in tables in this chapter.

The purpose of Table 1 (refer to the Sample Table 1 below) is to provide a summary comparison of specific plant AMR details with the corresponding tables of NUREG-1801, Volume 1. The table uses essentially the same format as Tables 1 through 6 of NUREG-1801, Volume 1, except that the "ID" and “Type” columns have been replaced by an “Item Number” column, the "Component" column was renamed the "Component/ Commodity" column, and the “Related Generic Item" and "Unique Item” columns have been replaced by a “Discussion” column. The “Item Number” column provides the reviewer with a means to cross-reference from Table 2 to Table 1. During the screening process, some structures and components (SCs) were incorporated into commodity groups based on similarity of their design or materials of construction. The "Further Evaluation Recommended" column identifies those cases where NUREG-1801 recommends further evaluation of a Table 1 Item. Separate text is included to provide these evaluations. The “Discussion” column provides clarifying or amplifying information. The following are examples of information that might be contained within this column.

- “Further Evaluation Recommended” – Information or reference to where that information text is located.
- The name of a plant-specific program being used.
- Exceptions to the GALL Report assumptions.
- A discussion of how the line is consistent with the corresponding line item in NUREG-1801, Volume 1, when it may appear inconsistent.
- A discussion of how the item is different from the corresponding line item in NUREG-1801, Volume 1, when it may appear to be consistent (e.g., when there

is exception taken to an aging management program (AMP) that is recommended in NUREG-1801).

The format of Table 1 provides the reviewer with a means of aligning a specific Table 1 row with the corresponding NUREG-1801, Volume 1, table row, thereby permitting easy checking of consistency.

Sample Table 1

Table 3.x.1 Summary of Aging Management Evaluations in Chapter __of NUREG-1801 for ______

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.x.1-01					
3.x.1-02					
3.x.1-03					

Table 2 (refer to the Sample Table 2 below) provides the detailed results of the AMRs for those components/commodities identified in LRA Chapter 2 as being subject to AMR. There will be a Table 2 for each of the systems within a Chapter 3 section. Table 2 consists of the following nine columns:

Component/Commodity – The first column identifies the components/commodities from Chapter 2 that are subject to AMR. Typically, they are listed in alphabetical order, or in approximately the order presented in NUREG-1801. During the screening process, some structures and components (SCs) were incorporated into commodity groups. Use of commodity groups made it possible to address an entire group of SCs with a single evaluation. In the AMRs described in the following Sections, further definition of commodity groups was performed based on design, material, environmental, and functional characteristics in order to disposition an entire group with a single AMR. Where possible, plant components/commodities were assigned to groups that coincided with NUREG-1801 component/commodity groups in order to facilitate alignment of components with NUREG-1801. The NUREG-1801 nomenclature was used even in cases where CR-3 has only a subset of the equipment types listed in the NUREG-1801 group. For example, a CR-3 commodity group in a given structure was defined to correspond to the NUREG-1801 commodity that addresses supports for platforms, pipe whip restraints, jet impingement shields, masonry walls, and other miscellaneous structures even though CR-3 may not have masonry walls in that structure.

Intended Function – The second column contains the license renewal intended functions (including abbreviations where applicable) for the listed component types. Definitions and abbreviations of intended functions are contained in Table 2.1-1.

Material – The third column lists the particular materials of construction for the component/commodity group.

Environment – The fourth column lists the environment to which the component types are exposed. Internal and external service environments are indicated. The service environments used or considered in the CR-3 AMR are listed below in Table 3.0-1. This table also correlates the service environments to the applicable environments used in NUREG-1801. During the AMR process, the NUREG-1801 environments are sometimes cited in the AMR tables in order to obtain a better alignment with the corresponding AMR line items from NUREG-1801.

Aging Effect Requiring Management – As part of the AMR process, aging effects requiring management are identified for material and environment combinations. These are listed in column five. The CR-3 AMR methodology is based on generic industry guidance for determining aging effects for both mechanical and structural components based on the materials of construction and applicable environmental conditions. The material and environment-based rules in the industry guidance documents are derived from known age-related degradation mechanisms and industry operating experience. Although not a requirement, both aging effects and aging mechanisms are frequently included on Table 2 to facilitate alignment with NUREG-1801.

Aging Management Programs – The AMPs used to manage the aging effects requiring management are identified in column six of Table 2. AMPs are described in Appendix B.

NUREG-1801, Volume 2, Item – Each combination of component type, material, environment, aging effect requiring management and AMP that is listed in Table 2, is compared to NUREG-1801, Volume 2, with consideration given to the standard notes, to identify consistencies. When they are identified, consistencies are documented by noting the appropriate NUREG-1801, Volume 2, item number in column seven of Table 2. If there is no corresponding item number in NUREG-1801, Volume 2, this row in column seven is left blank. Thus, a reviewer can readily identify where there is correspondence between the plant-specific tables and the NUREG-1801, Volume 2, tables.

Table 1 Item – Each combination of component, material environment, aging effect requiring management, and AMP that has an identified NUREG-1801, Volume 2, item number generally will have a Table 3.x.1 line item reference number. The corresponding line item from Table 1 is listed in column eight of Table 2. If there is no corresponding item in NUREG-1801, Volume 1, this row in column eight is left blank. Therefore, the information from the two tables can be correlated. Note that NUREG-1801, Rev. 1, contains material/environment combinations that result in no aging effects/mechanisms (AEMs) and, therefore, no AMP; these items are referenced in the same manner as line items that provide AEMs and AMPs.

Notes – In order to realize the full benefit of NUREG-1801, each applicant needs to identify how the information in Table 2 aligns with the information in NUREG-1801, Volume 2. This is accomplished through a series of notes. All notes designated with letters are standard notes that will be the same from application to application throughout the industry. Any additional, plant-specific notes will be identified by a number. Plant-specific notes provide information or clarification regarding the AMR of the Table 2 line item. The generic and plant-specific notes are listed at the end of Sections 3.1 through 3.6. Section 3.1 uses plant specific notes numbered in the 100-series (e.g., 101, 102, etc.). Section 3.2 uses plant-specific notes numbered in the 200-series; Section 3.3, in the 300-series; Section 3.4, in the 400-series; Section 3.5, in the 500-series; and Section 3.6, in the 600-series.

Experience in developing LRA AMR tables has shown that it is difficult to maintain consistency in the application of notes F, G, and J. Moreover, NRC reviews of previous applications have given little deference to the use of a note F or G versus a note J. Therefore, to enhance the consistency of the overall CR-3 LRA, notes F and G will not normally be used, and the AMR review will default instead to note J. This is an exception to the guidelines for use of standard notes in NEI 95-10, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule," Revision 6, Nuclear Energy Institute, June 2005.

Sample Table 2

Table 3.x.2-y Section 3 Title–Summary of Aging Management Evaluation–Plant Specific System

Component / Commodity	Intended Function	Material	Environ-ment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes

Table Usage

Each row in Table 1 is evaluated by the reviewer by moving from left to right across the table. No evaluation of information in the Component, Aging Effect/Mechanism, Aging Management Program or Further Evaluation Recommended columns is required, as this information is taken directly from NUREG-1801, Volume 1. The Discussion column provides the information of most use to the reviewer and summarizes the information necessary to determine how the AMR results align with NUREG-1801, Volume 1.

Table 2 provides the AMR information for the plant, irrespective of any comparisons to NUREG-1801. In a given row in the table, the reviewer can see the intended function, material, environment, aging effect requiring management, and AMP combination for a component/commodity type within a system. In addition, a referenced item number in column seven will identify any correlation between the information in Table 2 and that in

NUREG-1801, Volume 2. The reviewer can refer to the item number in NUREG-1801, Volume 2, if desired, to verify the correlation. If the column is blank, no correspondence to NUREG-1801, Volume 2 was identified. As the reviewer continues across the table from left to right in a row, the next column is labeled Table 1 Item. If there is a reference number to a corresponding row in Table 1, the reviewer can refer to Table 1 to determine how the AMP for this combination aligns with NUREG-1801. Table 2 provides a reviewer with a means to navigate from the components/ commodities subject to an AMR in LRA Chapter 2 through the evaluation of AMPs used to manage the effects of aging for those components/commodities.

TABLE 3.0-1 SERVICE ENVIRONMENTS

Service Environment [1]	Description		
Adverse Localized Environment	An adverse, localized environment is a term used in the AMR of Electrical and Instrumentation & Control components and is defined as a condition in a limited plant area that is significantly more severe than the specified service condition for the equipment.		
Air - Indoor/ Air - Indoor Uncontrolled	**Structure**	**Temperature**	**Relative Humidity**
	Auxiliary Building	55°F to 100°F	20% to 90%
	Control Complex (CC)	70°F to 80°F	30% to 60%
	CC EFIC Room	50°F to 85°F	30% to 60%
	Diesel Generator Building	65°F to 120°F	20% to 90%
	EFW Pump Building	15°F to 99°F	20% to 100%
	Dedicated EFW Tank Enclosure Building	36°F to 90°F	20% to 100%
	Fire Service Pumphouse	60°F to 115°F	20% to 100%
	Intermediate Building	55°F to 140°F	20% to 90%
	Machine Shop	70°F to 75°F	20% to 60%
	Turbine Building (TB)	35°F to 119°F	20% to 60%
	TB Steam Generator Area Sampling Room	75°F	20% to 100%
	TB Battery Rooms	77°F	20% to 100%
	Borated Water Storage Tank Room	53°F to 91°F	20% to 100%
	Other Buildings/Structures	15°F to 99°F	20% to 100%
	Reactor Building (RB) (except for areas below)	60°F to 130°F	20% to 90%
	RB 95 ft. Elev.	70°F to 109°F	20% to 90%
	RB Outside D-Rings Below Elev 160 ft.	60°F to 119°F	20% to 90%
	RB Outside D-Rings Above Elev 160 ft.	60°F to 149°F	20% to 90%
	RB Inside D-Rings Above Elev 119 ft.	60°F to 149°F	20% to 90%
	RB Inside "A" D-Ring Above Elev 119 ft. (near top of Pressurizer)	60°F to 164.3°F	20% to 90%
	RB Inside Primary Shield Wall	<200°F	20% to 90%
	The Air - Indoor/Air - Indoor Uncontrolled environment may contain significant amounts of moisture or water pooling may occur. Air - Indoor/Air - Indoor Uncontrolled may represent the following NUREG-1801 terminology: • Air • Air - Indoor Controlled (External) • Air - Indoor Uncontrolled (Internal and/or External) • Air with Reactor Coolant Leakage • Air with Borated Water Leakage • Air with Steam or Water Leakage • Condensation (Internal or External) • Moist Air or Condensation (Internal) • Air - Indoor Uncontrolled or Air - Outdoor • Any • Various		

TABLE 3.0-1 (continued) SERVICE ENVIRONMENTS

Service Environment [1]	Description
Air - Outdoor	This environment is exposed to wind and weather and subject to periodic wetting, alternate wetting and drying, and salt-laden air. Temperature Range: 15°F to > 95°F, but < 140°F Relative Humidity Range 20% to 100% For the purposes of AMR, Air - Outdoor may represent the following NUREG-1801 terminology: • Air - Outdoor • Air - Indoor Uncontrolled or Air - Outdoor • Air - Outdoor (Internal) • Air - Outdoor (External) • Any • Various
Dry Air/Gas	Noncondensable vapor with a very limited percentage of moisture present. This environment includes air that has been treated to reduce the dewpoint well below the system operating temperature and commercial grade gases (such as, nitrogen, freon, etc.) that are provided as a high quality product with little if any external contaminants. For the purposes of AMR, Dry Air/Gas may represent the following NUREG-1801 terminology: • Gas • Air, Dry
Borated Water Leakage	The Civil/Structural review applies Borated Water Leakage to represent the following NUREG-1801 terminology • Air with Borated Water Leakage The Mechanical discipline uses Air - Indoor uncontrolled for this environment.
Closed-Cycle Cooling Water	Closed Cycle Cooling Water is demineralized water treated with corrosion inhibitors, pH control agents, or biocides, as needed. It is used in closed cooling loops such as the Secondary Services Closed Cycle Cooling Water System and the Decay Heat Closed Cycle Cooling Water System. For the purposes of AMR, Closed Cycle Cooling Water may represent the following NUREG-1801 terminology: • Closed Cycle Cooling Water
Concrete	An environment where components are embedded in concrete. This environment is considered aggressive when the concrete pH <11.5 or chlorides concentration >500 ppm. For the purposes of AMR, Concrete may represent the following NUREG-1801 terminology: • Concrete • Concrete; Steel • Reinforced Concrete
Diesel Exhaust	This environment represents the exhaust from diesel engines. It is considered to have the potential to concentrate contaminants and be subject to wetting through condensation. For the purposes of AMR, Diesel Exhaust may represent the following NUREG 1801 terminology: • Diesel Exhaust

TABLE 3.0-1 (continued) SERVICE ENVIRONMENTS

Service Environment [1]	Description
Fire Water	Water is supplied to Fire Service Water and other CR-3 plant systems from the CR-3 Fire Service Water Tanks. While this is in turn supplied from the CR-1 Water Treatment Plant, Fire Water is being identified separately to facilitate better alignment with NUREG-1801 Fire Protection line items.
Fuel Oil	Fuel oil for components requiring aging management exposed to a diesel fuel environment. Water contamination of fuel oil is assumed. For the purposes of AMR, Fuel Oil may represent the following NUREG-1801 terminology: • Fuel oil
Lubricating Oil	Lubricating oils are low to medium viscosity hydrocarbons used for bearing, gear, and engine lubrication. Water contamination of lubricating oil is assumed. For the purposes of AMR, Lubricating Oil may represent the following NUREG-1801 terminology: • Lubricating Oil
Open-Cycle Cooling Water	Water supplied from the Gulf of Mexico to CR-3 open cycle cooling water systems. Generally, this consists of water supplied to the Circulating Water and Nuclear Service and Decay Heat Sea Water Systems.
Radiation (Normal Operational Exposure)	This is an environment where components are exposed to total integrated dose due to normal operational exposure for 60 years from radiation. Auxiliary Building (AB) (General Area) 5.25×10^5 rads AB Make Up Prefilter Area 5.25×10^8 rads AB Southeast Piping Penetration Area 1.6×10^6 rads Control Complex 5.25×10^2 rads Diesel Generator Building 5.25×10^2 rads Intermediate Building 6.3×10^4 rads Reactor Building: 2.1×10^7 rads Inside Face of the Primary Shield Wall 2.29×10^9 rads Inside D-Rings 4.95×10^7 rads All other areas Negligible
Radiation (Neutron Fluence)	This is an environment where there is the potential for exposure to neutron radiation. This is applicable only in the Reactor Building. The maximum neutron fluence on the inside surface of the primary shield wall is 5.19×10^{17} n/cm^2 (E > 1 MeV) for 60 years.
Radiation (Ultraviolet)	This is an environment where there is the potential for exposure to electromagnetic energy with a lower frequency than that of gamma or X-rays. UV radiation sources include solar radiation and ultraviolet or fluorescent lamps.

TABLE 3.0-1 (continued) SERVICE ENVIRONMENTS

Service Environment [1]	Description
Raw Water	The Gulf of Mexico (seawater) provides one source of raw water utilized by CR-3. Raw water is also rain or groundwater that has not been demineralized or chemically treated to any significant extent. The raw water from groundwater at CR-3 originates in deep wells located along the transmission lines right of way by the plant access road. This untreated well water is pumped to the CR-1 water treatment facility where it is treated and conditioned to meet potable (drinking water) standards. Raw Water includes Domestic and Potable Water supplied from the water treatment facility. Raw water may contain contaminants including biocides, oil, and boric acid depending on the location. Floor drains and reactor building and auxiliary building sumps may be exposed to a variety of untreated water that is thus classified as Raw Water for the determination of aging effects. Based on the seawater water chemistry, seawater is an aggressive environment because the sulfate content is greater than 1500 ppm and the chloride content is greater than 500 ppm as defined in NUREG-1801, Volume 2. Seawater water chemistry is as follows: pH 7.5 to 8.5 Sulfates (as SO_4) 2649 mg/L (or ppm) Chlorides (Cl) 19400 mg/L The Mechanical discipline categorizes seawater from the Gulf of Mexico as Open Cycle Cooling Water and the raw water supplied to the Fire Service Water Tanks as Fire Water. For the purposes of AMR, Raw Water may represent the following NUREG-1801 terminology: • Any • Ground water/soil or Air - Indoor Uncontrolled or Air - Outdoor • Ground water/soil • Raw water • Fire Water • Open-Cycle Cooling Water • Water flowing • Water flowing or Water standing • Water flowing under foundation
Reactor Coolant/Reactor Coolant and Neutron Flux	Treated water environments may be synergistically impacted by environmental stressors associated with the reactor vessel. The environments Reactor Coolant and Reactor Coolant and Neutron Flux will be used as applicable to represent the following NUREG-1801 terminology in the Reactor Coolant System. • Reactor coolant • Reactor coolant and neutron flux • Reactor coolant and secondary feedwater/steam • Reactor coolant/steam

TABLE 3.0-1 (continued) SERVICE ENVIRONMENTS

Service Environment [1]	Description
Soil	External environment for components buried in the soil, including groundwater in the soil. This environment is "non-aggressive" as defined in NUREG-1801 based on groundwater chemical analysis. Groundwater chemistry from plant site wells is as follows: — Well CR3-2 — Well CR-1S pH — 7.64 — 7.19 Sulfates (as SO_4) — 11 ppm — 140 ppm Chlorides (Cl) — 37 ppm — 450 ppm Phosphates — < 0.5 ppm — < 0.5 ppm For the purposes of AMR, Soil may represent the following NUREG-1801 terminology: • Soil
Steam	Steam supply from the steam generators or heating and process steam produced from the boiler. For the purposes of AMR, Steam may represent the following NUREG-1801 terminology: • Reactor Coolant and Secondary Feedwater/Steam • Reactor Coolant/Steam • Secondary Feedwater/Steam • Steam
Treated Water	Treated water is demineralized water or chemically purified water and is the base water for all clean systems. Depending on the system, treated water may require further processing. Treated water could be deaerated and include corrosion inhibitors, biocides, or some combination of these treatments. For the purposes of AMR, Treated Water may represent the following NUREG-1801 terminology: • Reactor Coolant • Reactor Coolant and Secondary Feedwater/Steam • Reactor Coolant/Steam • Secondary Feedwater • Secondary Feedwater/Steam • Steam • Treated Borated Water • Treated Water • Treated Water > 60°C (> 140°F) • Treated Water or Treated Borated Water • Treated Borated Water > 60°C (> 140°F)

NOTE: 1. The CR-3 Service Environments may be internal or external depending on the physical form and function of the component/commodity being considered. For mechanical components, whether an environment is internal or external is identified on the AMR tables for the system under review. The environments for civil/structural and electrical components are external unless otherwise noted.

[This page intentionally blank]

3.1 AGING MANAGEMENT OF REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

3.1.1 INTRODUCTION

Section 3.1 provides the results of the aging management reviews (AMRs) for those components identified in Subsection 2.3.1, Reactor Vessel, Internals, and Reactor Coolant System, subject to aging management review. The systems are described in the indicated subsections.

1. Reactor Coolant System (Subsection 2.3.1.1)

2. Control Rod Drive Control System (Subsection 2.3.1.2)

3. Incore Monitoring System (Subsection 2.3.1.3)

Table 3.1.1, Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System, provides the summary of the programs evaluated in NUREG-1801 that are applicable to component/ commodity groups in this Section. Table 3.1.1 uses the format of Table 1 described in Section 3.0 above.

3.1.1.1 Operating Experience

The AMR methodology applied at CR-3 included use of operating experience (OE) to confirm the set of aging effects that had been predicted through material/environment evaluations. Plant-specific and industry OE was identified and reviewed in conjunction with the aging management review. The OE review consisted of the following:

Site: CR-3 site-specific OE has been captured by a review of Licensee Event Reports and other docketed information, site Action Requests (ARs), Maintenance Rule Database, System notebooks, and other relevant information. The site-specific OE review identified no unique or unpredicted aging effects requiring management

Industry: Industry OE has been captured in NUREG-1801, "Generic Aging Lessons Learned (GALL)," and is the primary method for verifying that a complete set of potential aging effects is identified. An evaluation of industry OE published since the effective date of NUREG-1801 was performed to identify any additional aging effects requiring management. This was performed using Progress Energy internal OE review process which directs the review of OE and requires that it be screened and evaluated for site applicability. OE sources subject to review include INPO and WANO items, NRC documents (Information Notices, Generic Letters, Notices of Violation, and staff reports), 10 CFR 21 reports, and vendor bulletins, as well as corporate internal OE information from Progress Energy nuclear sites. The industry OE review identified no additional unpredicted aging effects requiring management.

On-Going On-going review of plant-specific and industry operating experience is continuing to be performed in accordance with the Corrective Action Program and the Progress Energy internal OE review process.

3.1.2 RESULTS

The following tables summarize the results of the aging management review for systems in the Reactor Vessel, Internals, and Reactor Coolant System area.

These tables use the format of Table 2 described in Section 3.0 above.

3.1.2.1 Materials, Environment, Aging Effects Requiring Management and Aging Management Programs

The materials from which specific components/commodities are fabricated, the environments to which they are exposed, the aging effects requiring management, and the aging management programs used to manage these aging effects are provided for each of the above systems in the following subsections.

3.1.2.1.1 Reactor Coolant System

Materials

The materials of construction for the Reactor Coolant System components are:

- Carbon or Low Alloy Steel
- Carbon Steel
- Carbon Steel with Stainless Steel Cladding
- Cast Austenitic Stainless Steel
- Copper and Copper Alloys
- High Strength Low Alloy Steel
- Low Alloy Steel
- Low Alloy Steel with Nickel Base Alloy Cladding

- Low Alloy Steel with Stainless Steel Cladding
- Nickel Base Alloys
- Stainless Steel

Environment

The Reactor Coolant System components are exposed to the following:

- Air - Indoor Uncontrolled
- Closed-Cycle Cooling Water
- Lubricating Oil
- Reactor Coolant
- Reactor Coolant and Neutron Flux
- Steam
- Treated Water

Aging Effects Requiring Management

The following Reactor Coolant System aging effects require management:

- Change in Dimensions
- Cracking
- Cumulative Fatigue Damage
- Denting
- Ligament Cracking
- Loss of Fracture Toughness
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Reactor Coolant System components:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC and IWD Program
- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System
- External Surfaces Monitoring Program
- Flow-Accelerated Corrosion Program
- Lubricating Oil Analysis Program
- Nickel Alloy Commitment
- Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors Program
- One-Time Inspection Program

- One-Time Inspection of ASME Code Class 1 Small-Bore Piping Program
- Reactor Head Closure Studs Program
- Reactor Vessel Internals Commitment
- Reactor Vessel Surveillance Program
- Selective Leaching of Materials Program
- Steam Generator Tube Integrity Program
- Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program
- Water Chemistry Program

3.1.2.1.2 Control Rod Drive Control System

Materials

The materials of construction for the Control Rod Drive Control System components are:

- Stainless Steel

Environment

The Control Rod Drive Control System components are exposed to the following:

- Air - Indoor Uncontrolled
- Closed-Cycle Cooling Water
- Reactor Coolant

Aging Effects Requiring Management

The following Control Rod Drive Control System aging effects require management:

- Cracking
- Cumulative Fatigue Damage
- Loss of Material

Aging Management Programs

The following AMPs manage the aging effects for the Control Rod Drive Control System components:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program
- Closed-Cycle Cooling Water System Program
- Water Chemistry Program

3.1.2.1.3 Incore Monitoring System

Materials

The materials of construction for the Incore Monitoring System components are:
- Stainless Steel

Environment

The Incore Monitoring System components are exposed to the following:
- Air - Indoor Uncontrolled
- Reactor Coolant

Aging Effects Requiring Management

The following Incore Monitoring System aging effects require management:
- Cracking
- Cumulative Fatigue Damage
- Loss of Material

Aging Management Programs

The following AMPs manage the aging effects for the Incore Monitoring System components:
- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program
- One-Time Inspection of ASME Code Class 1 Small Bore-Piping Program
- Water Chemistry Program

3.1.2.2 Further Evaluation of Aging Management as Recommended by NUREG-1801

NUREG-1801 identifies aging management activities that warrant further evaluation. For the Reactor Vessel, Internals, and Reactor Coolant System, those activities are addressed in the following subsections.

3.1.2.2.1 Cumulative Fatigue Damage

Fatigue is a TLAA as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c)(1). CR-3 License Renewal TLAA evaluations are addressed in Chapter 4; the evaluation of TLAAs associated with cumulative fatigue damage is addressed in Section 4.3.

3.1.2.2.2 Loss of Material Due to General, Crevice, and Pitting Corrosion

3.1.2.2.2.1 BWR Reactor Vessel Components Exposed to Treated Water and Steam and PWR Once-through Steam Generator Shell Exposed to Treated Water and Steam

Loss of material for BWR reactor vessel components is applicable to BWR plants only.

Loss of material due to general, pitting, and crevice corrosion could occur in the steel PWR steam generator shell assembly exposed to secondary feedwater and steam. Loss of material due to general, pitting, and crevice corrosion could also occur for the steel top head enclosure top head nozzles exposed to reactor coolant. CR-3 will manage the loss of material due to general, pitting and crevice corrosion in the steel components exposed to secondary feedwater/steam and reactor coolant in the Steam Generator with the Water Chemistry Program. In addition, CR-3 will implement a One-Time Inspection Program for susceptible locations to verify the effectiveness of the Water Chemistry program in managing the loss of material due to general, pitting and crevice corrosion. The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the prevention or mitigation of the cracking aging effect. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.1.2.2.2.2 BWR Isolation Condenser Components Exposed to Reactor Coolant

Loss of material of BWR isolation condenser components is applicable to BWR plants only.

3.1.2.2.2.3 BWR Reactor Vessel and associated Reactor Coolant Pressure Boundary Components

Loss of material of BWR reactor vessel and reactor coolant pressure boundary components is applicable to BWR plants only.

3.1.2.2.2.4 PWR Steam Generator Shell and Transition Cone

Table 3.1.1 Item Number 3.1.1-16 is not applicable to CR-3. This component, material, environment, and aging effect/mechanism does not apply to the Reactor Vessel, Internals and Reactor Coolant System.

3.1.2.2.3 Loss of Fracture Toughness Due to Neutron Irradiation Embrittlement

3.1.2.2.3.1 Neutron Irradiation Embrittlement TLAA

Certain aspects of the loss of fracture toughness due to neutron irradiation embrittlement are TLAAs as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c)(1). The evaluation of this TLAA is addressed separately in Section 4.2.

3.1.2.2.3.2 Reactor Vessel Embrittlement

Loss of fracture toughness due to neutron irradiation embrittlement could occur in the reactor vessel beltline, shell, nozzle, and welds. CR-3 employs the Reactor Vessel Surveillance program to manage the loss of fracture toughness due to neutron irradiation embrittlement in the reactor vessel beltline shell, nozzle and welds exposed to reactor coolant and neutron flux. The CR-3 Reactor Vessel Surveillance Program, and the results of its evaluation for license renewal, are presented in Appendix B.

Note: The reactor vessel inlet, outlet, and core flood nozzles are not exposed to a neutron fluence greater than 1E17 n/cm^2 (E > 1 MeV).

3.1.2.2.4 Cracking Due to Stress Corrosion Cracking (SCC) and Intergranular Stress Corrosion Cracking (IGSCC)

3.1.2.2.4.1 BWR Vessel Leak Detection Lines

Cracking of BWR vessel leak detection lines is applicable to BWR plants only.

3.1.2.2.4.2 BWR Isolation Condenser Components

Cracking of isolation condenser components is applicable to BWR plants only.

3.1.2.2.5 Crack Growth Due to Cyclic Loading

Crack growth due to cyclic loading (i.e., underclad cracking) 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 crack growth due to cyclic loading as a TLAA for the Reactor Vessel is discussed in Section 4.2.

3.1.2.2.6 Loss of Fracture Toughness Due to Neutron Irradiation Embrittlement and Void Swelling

Loss of fracture toughness due to neutron irradiation embrittlement and void swelling could occur in stainless steel and nickel alloy reactor vessel Internals exposed to reactor coolant and neutron flux. CR-3 provides in the FSAR Supplement a commitment to: (1) participate in the industry programs for investigating and managing

aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.

3.1.2.2.7 Cracking Due to Stress Corrosion Cracking (SCC)

3.1.2.2.7.1 PWR Vessel Leak Detection Piping and Bottom-Mounted Instrument Guide Tubes

Two metallic O-rings seal the reactor vessel when the reactor closure head is bolted in place. Leak-off taps are provided in the annulus between the two O-rings to dispose of leakage. Piping and associated valving are provided to direct any leakage to the Reactor Building sump. Cracking due to SCC could occur in stainless steel PWR reactor vessel flange leak detection lines. Cracking due to SCC of these lines is managed by a combination of the Water Chemistry Program and the One-Time Inspection Program. The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the prevention or mitigation of the cracking aging effect. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

The Incore Monitoring System includes the detector instrumentation piping that is an extension of the reactor coolant pressure boundary. Cracking due to SCC in these lines is managed by a combination of the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, Water Chemistry Program, and One-Time Inspection of ASME Code Class 1 Small-Bore Piping Program. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program has been shown to be effective in managing aging effects in Class 1, 2, or 3 components and their integral attachments in light-water cooled power plants.

The Incore Monitoring System includes the bottom-mounted detector instrumentation piping that is an extension of the reactor coolant pressure boundary.

3.1.2.2.7.2 Cast Austenitic Stainless Steel (CASS) Reactor Coolant System Components

Cracking due to SCC could occur in Class 1 PWR CASS piping and components exposed to reactor coolant. Screening based on ferrite and carbon content has not been used as a susceptibility criterion for CASS components at CR-3. These components have been aligned to either items 3.1.1-68 or 3.1.1-70 on Table 3.1.1.

3.1.2.2.8 Cracking Due to Cyclic Loading

3.1.2.2.8.1 BWR Jet Pump Sensing Lines

Cracking of BWR jet pump sensing lines is applicable to BWR plants only.

3.1.2.2.8.2 BWR Isolation Condenser Components

Cracking of isolation condenser components is applicable to certain BWR plants only.

3.1.2.2.9 Loss of Preload Due to Stress Relaxation

Loss of preload due to stress relaxation could occur in stainless steel and nickel alloy PWR reactor vessel internal components exposed to reactor coolant. CR-3 provides in the FSAR Supplement a commitment to: (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.

3.1.2.2.10 Loss of Material Due to Erosion

Table 3.1.1 Item Number 3.1.1-28 is not applicable to CR-3. This component, material, environment, and aging effect/mechanism does not apply to the Reactor Vessel, Internals and Reactor Coolant System.

3.1.2.2.11 Cracking Due to Flow-Induced Vibration of BWR Steam Dryers

Cracking of BWR steam dryer components is applicable to BWR plants only.

3.1.2.2.12 Cracking Due to Stress Corrosion Cracking and Irradiation-Assisted Stress Corrosion Cracking (IASCC)

Cracking due to SCC and IASCC could occur in PWR stainless steel reactor internals exposed to reactor coolant. CR-3 manages the reactor vessel internals components exposed to reactor coolant with the Water Chemistry Program. The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the prevention or mitigation of the cracking aging effect.

In addition, CR-3 provides in the FSAR Supplement a commitment to: (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.

3.1.2.2.13 Cracking Due to Primary Water Stress Corrosion Cracking (PWSCC)

Cracking due to PWSCC could occur in PWR components made with nickel alloy and steel with nickel alloy cladding exposed to reactor coolant. Cracking due to SCC (including PWSCC) of nickel alloy and low alloy steel with nickel alloy cladding, including reactor coolant pressure boundary components and penetrations inside the RCS such as pressurizer heater sheaths and sleeves, nozzles, and other internal components is managed by a combination of the Water Chemistry Program and the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program. The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the prevention or mitigation of the cracking aging effect. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program has been shown to be effective in managing aging effects in Class 1, 2, or 3 components and their integral attachments in light water-cooled power plants.

In addition, CR-3 provides in the FSAR Supplement a commitment to comply with applicable NRC Orders and to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.

3.1.2.2.14 Wall Thinning Due to Flow-Accelerated Corrosion

Table 3.1.1 Item Number 3.1.1-32 is not applicable to CR-3. Wall thinning due to flow-accelerated corrosion in the steel feedwater inlet header is discussed in Item Number 3.4.1-29.

3.1.2.2.15 Changes in Dimensions Due to Void Swelling

Changes in dimensions due to void swelling could occur in stainless steel and nickel alloy PWR reactor vessel internal components exposed to reactor coolant. CR-3 provides in the FSAR Supplement a commitment to: (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.

3.1.2.2.16 Cracking Due to Stress Corrosion Cracking and Primary Water Stress Corrosion Cracking

3.1.2.2.16.1 Control Rod Drive Head Penetration Pressure Housings and Once-Through Steam Generator Primary Side Components and Upper and Lower Heads, Tubesheets, and Tube-to-Tubesheet Welds

Cracking due to stress corrosion cracking in stainless steel reactor Control Rod Drive Head Penetration Pressure Housings will be managed by the ASME Section XI

Inservice Inspection program, Subsections IWB, IWC, and IWD, and the Water Chemistry program. The CR-3 Control Rod Drive Head Penetration Pressure Housings are constructed of stainless steel, so that the commitment to comply with applicable NRC Orders regarding cracking of nickel alloy components is not applicable.

The ASME Section XI Inservice Inspection Program, Subsections IWB, IWC, and IWD and the Water Chemistry Program will manage the aging effects of cracking due to stress corrosion cracking in steam generator upper and lower heads and primary nozzles that are steel with stainless steel cladding

The ASME Section XI Inservice Inspection program, Subsections IWB, IWC, and IWD and the Water Chemistry program will manage the aging effects of cracking due to primary water stress corrosion cracking in steam generator tubesheets that are steel with nickel-alloy cladding. Regarding cracking of nickel alloy components, CR-3 provides in the FSAR Supplement a commitment to comply with applicable NRC Orders and to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.

The ASME Section XI Inservice Inspection program, Subsections IWB, IWC, and IWD and the Water Chemistry program will manage the aging effects of cracking due to primary water stress corrosion cracking in primary manway and inspection opening cover backing plates that are stainless steel.

The CR-3 steam generator tube support plates are made of steel, and are not susceptible to cracking due to SCC.

3.1.2.2.16.2 Pressurizer Spray Head

This item is not applicable to CR-3; the pressurizer spray head has no intended function.

3.1.2.2.17 Cracking Due to Stress Corrosion Cracking, Primary Water Stress Corrosion Cracking, and Irradiation-Assisted Stress Corrosion Cracking

Cracking due to SCC, PWSCC, or IASCC could occur in stainless steel and nickel alloy PWR reactor vessel internal components. CR-3 manages cracking due to SCC of the PWR stainless steel and nickel alloy reactor vessel internals components with the Water Chemistry Program. The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the prevention or mitigation of the cracking aging effect.

In addition, CR-3 provides in the FSAR Supplement a commitment to: (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.

3.1.2.2.18 Quality Assurance for Aging Management of Non-Safety Related Components

QA provisions applicable to License Renewal are discussed in Section B.1.3.

3.1.2.3 Time-Limited Aging Analysis

The Time-Limited Aging Analyses (TLAA) identified below are associated with the Reactor Vessel, Internals, and Reactor Coolant System components. The section of the application that contains the TLAA review results is indicated in parenthesis.

1. Neutron Irradiation Embrittlement (Section 4.2)
2. Metal Fatigue (Section 4.3)
3. Cyclic Loading (Section 4.3)
4. Flow-Induced Vibration (Section 4.3)

3.1.3 CONCLUSIONS

The Reactor Vessel, Internals, and Reactor Coolant System components/commodities having aging effects requiring management have been evaluated, and aging management programs have been selected to manage the aging effects. A description of the aging management programs is provided in Appendix B, along with a demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the demonstration provided in Appendix B, the effects of aging will be adequately managed so that there is reasonable assurance that the intended functions of Reactor Vessel, Internals, and Reactor Coolant System components/ commodities will be maintained consistent with the current licensing basis during the period of extended operation.

TABLE 3.1.1 SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-01	Steel pressure vessel support skirt and attachment welds	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue of metal components is addressed as a TLAA. Further evaluation is documented in Subsection 3.1.2.2.1.
3.1.1-02	BWR Only				
3.1.1-03	BWR Only				
3.1.1-04	BWR Only				
3.1.1-05	Stainless steel and nickel alloy reactor vessel internals components	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue of metal components is addressed as a TLAA. Further evaluation is documented in Subsection 3.1.2.2.1.
3.1.1-06	Nickel Alloy tubes and sleeves in a reactor coolant and secondary feedwater/steam environment	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue of metal components is addressed as a TLAA. Further evaluation is documented in Subsection 3.1.2.2.1.
3.1.1-07	Steel and stainless steel reactor coolant pressure boundary closure bolting, head closure studs, support skirts and attachment welds, pressurizer relief tank components, steam generator components, piping and components external surfaces and bolting	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue of metal components is addressed as a TLAA. Further evaluation is documented in Subsection 3.1.2.2.1.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-08	Steel; stainless steel; and nickel-alloy reactor coolant pressure boundary piping, piping components, piping elements; flanges; nozzles and safe ends; pressurizer vessel shell heads and welds; heater sheaths and sleeves; penetrations; and thermal sleeves	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c) and environmental effects are to be addressed for Class 1 components	Yes, TLAA	Fatigue of metal components is addressed as a TLAA. Further evaluation is documented in Subsection 3.1.2.2.1.
3.1.1-09	Steel; stainless steel; steel with nickel-alloy or stainless steel cladding; nickel-alloy reactor vessel components: flanges; nozzles; penetrations; pressure housings; safe ends; thermal sleeves; vessel shells, heads and welds	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c) and environmental effects are to be addressed for Class 1 components	Yes, TLAA	Fatigue of metal components is addressed as a TLAA. Further evaluation is documented in Subsection 3.1.2.2.1.
3.1.1-10	Steel; stainless steel; steel with nickel-alloy or stainless steel cladding; nickel-alloy steam generator components (flanges; penetrations; nozzles; safe ends, lower heads and welds)	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c) and environmental effects are to be addressed for Class 1 components	Yes, TLAA	Fatigue of metal components is addressed as a TLAA. Further evaluation is documented in Subsection 3.1.2.2.1.
3.1.1-11	BWR Only				

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-12	Steel steam generator shell assembly exposed to secondary feedwater and steam	Loss of material due to general, pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. The One-Time Inspection Program will be used to verify the effectiveness of the Water Chemistry Program to manage the loss of material due to general, pitting and crevice corrosion in the steel steam generator shell assembly and steam generator components exposed to treated water and reactor coolant. Further evaluation is documented in Subsection 3.1.2.2.2.1.
3.1.1-13	BWR Only				
3.1.1-14	BWR Only				
3.1.1-15	BWR Only				
3.1.1-16	Steel steam generator upper and lower shell and transition cone exposed to secondary feedwater and steam	Loss of material due to general, pitting and crevice corrosion	Inservice Inspection (IWB, IWC, and IWD), and Water Chemistry and, for Westinghouse Model 44 and 51 S/G, if general and pitting corrosion of the shell is known to exist, additional inspection procedures are to be developed.	Yes, detection of aging effects is to be evaluated	This item is not applicable to CR-3. Further evaluation is documented in Subsection 3.1.2.2.2.4.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-17	Steel (with or without stainless steel cladding) reactor vessel beltline shell, nozzles, and welds	Loss of fracture toughness due to neutron irradiation embrittlement	TLAA, evaluated in accordance with Appendix G of 10 CFR 50 and RG 1.99. The applicant may choose to demonstrate that the materials of the nozzles are not controlling for the TLAA evaluations.	Yes, TLAA	Loss of fracture toughness due to neutron irradiation embrittlement is addressed as a TLAA in Section 4.2. Further evaluation is documented in Subsection 3.1.2.2.3.1.
3.1.1-18	Steel (with or without stainless steel cladding) reactor vessel beltline shell, nozzles, and welds; safety injection nozzles	Loss of fracture toughness due to neutron irradiation embrittlement	Reactor Vessel Surveillance	Yes, plant specific	The CR-3 Reactor Vessel Surveillance Program is used to manage the aging effects of loss of fracture toughness due to neutron irradiation embrittlement. Further evaluation is documented in Subsection 3.1.2.2.3.2.
3.1.1-19	BWR Only				
3.1.1-20	BWR Only				
3.1.1-21	Reactor vessel shell fabricated of SA508-Cl 2 forgings clad with stainless steel using a high-heat input welding process	Crack growth due to cyclic loading	TLAA	Yes, TLAA	Crack growth due to cyclic loading (underclad cracking) is a TLAA; further evaluation is documented in Subsection 3.1.2.2.5.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-22	Stainless steel and nickel alloy reactor vessel internals components exposed to reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement, void swelling	FSAR supplement commitment to (1) participate in industry RVI aging programs (2) implement applicable results (3) submit for NRC approval > 24 months before the extended period an RVI inspection plan based on industry recommendation.	No, but licensee commitment to be confirmed	Consistent with NUREG-1801. The CR-3 commitment is described in the FSAR supplement. Further evaluation is documented in Subsection 3.1.2.2.6.
3.1.1-23	Stainless steel reactor vessel closure head flange leak detection line and bottom-mounted instrument guide tubes	Cracking due to stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes, plant specific	The plant-specific AMPs that manage the stainless steel reactor vessel closure head flange leak detection line are the Water Chemistry Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.1.2.2.7.1.
3.1.1-24	Class 1 cast austenitic stainless steel piping, piping components, and piping elements exposed to reactor coolant	Cracking due to stress corrosion cracking	Water Chemistry and, for CASS components that do not meet the NUREG-0313 guidelines, a plant specific aging management program	Yes, plant specific	This item is not applicable to CR-3. Further evaluation is documented in Subsection 3.1.2.2.7.2.
3.1.1-25	BWR Only				
3.1.1-26	BWR Only				

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-27	Stainless steel and nickel alloy reactor vessel internals screws, bolts, tie rods, and hold-down springs	Loss of preload due to stress relaxation	FSAR supplement commitment to (1) participate in industry RVI aging programs (2) implement applicable results (3) submit for NRC approval > 24 months before the extended period an RVI inspection plan based on industry recommendation.	No, but licensee commitment to be confirmed	Consistent with NUREG-1801. The CR-3 commitment is described in the FSAR supplement. Further evaluation is documented in Subsection 3.1.2.2.9.
3.1.1-28	Steel steam generator feedwater impingement plate and support exposed to secondary feedwater	Loss of material due to erosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific	This item is not applicable to CR-3. Further evaluation is documented in Subsection 3.1.2.2.10.
3.1.1-29	BWR Only				
3.1.1-30	Stainless steel reactor vessel internals components (e.g., Upper internals assembly, RCCA guide tube assemblies, Baffle/former assembly, Lower internal assembly, shroud assemblies, Plenum cover and plenum cylinder, Upper grid assembly, Control rod guide tube (CRGT) assembly, Core support shield assembly, Core barrel assembly, Lower grid assembly, Flow distributor assembly, Thermal shield, Instrumentation support structures)	Cracking due to stress corrosion cracking, irradiation-assisted stress corrosion cracking	Water Chemistry and FSAR supplement commitment to (1) participate in industry RVI aging programs (2) implement applicable results (3) submit for NRC approval > 24 months before the extended period an RVI inspection plan based on industry recommendation.	No, but licensee commitment needs to be confirmed	Consistent with NUREG-1801. CR-3 manages the reactor vessel internals components exposed to reactor coolant with the Water Chemistry Program. The CR-3 commitment is described in the FSAR supplement. Further evaluation is documented in Subsection 3.1.2.2.12.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-31	Nickel alloy and steel with nickel-alloy cladding piping, piping component, piping elements, penetrations, nozzles, safe ends, and welds (other than reactor vessel head); pressurizer heater sheaths, sleeves, diaphragm plate, manways and flanges; core support pads/core guide lugs	Cracking due to primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD) and Water Chemistry and FSAR supp commitment to implement applicable plant commitments to (1) NRC Orders, Bulletins, and Generic Letters associated with nickel alloys and (2) staff-accepted industry guidelines.	No, but licensee commitment needs to be confirmed	Consistent with NUREG-1801. The aging effect is managed by a combination of the Water Chemistry Program and the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program. The CR-3 commitment is described in the FSAR supplement. Further evaluation is documented in Subsection 3.1.2.2.13.
3.1.1-32	Steel steam generator feedwater inlet ring and supports	Wall thinning due to flow-accelerated corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific	This item is not applicable to CR-3. Wall thinning due to flow-accelerated corrosion in the steel feedwater inlet header is discussed in Item Number 3.4.1-29. Further evaluation is documented in Subsection 3.1.2.2.14.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-33	Stainless steel and nickel alloy reactor vessel internals components	Changes in dimensions due to void swelling	FSAR supplement commitment to (1) participate in industry RVI aging programs (2) implement applicable results (3) submit for NRC approval > 24 months before the extended period an RVI inspection plan based on industry recommendation.	No, but licensee commitment to be confirmed	Consistent with NUREG-1801. The CR-3 commitment is described in the FSAR supplement. Further evaluation is documented in Subsection 3.1.2.2.15.
3.1.1-34	Stainless steel and nickel alloy reactor control rod drive head penetration pressure housings	Cracking due to stress corrosion cracking and primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD) and Water Chemistry and for nickel alloy, FSAR supplement commitment to implement applicable plant commitments to (1) NRC Orders, Bulletins and Generic Letters associated with nickel alloys and (2) staff-accepted industry guidelines.	No, but licensee commitment needs to be confirmed	Consistent with NUREG-1801. Cracking is managed by a combination of the Water Chemistry Program and the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program. Further evaluation is documented in Subsection 3.1.2.2.16.1. A commitment relative to aging management of nickel alloy components is not needed as these components are fabricated of stainless steel at CR-3.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-35	Steel with stainless steel or nickel alloy cladding primary side components; steam generator upper and lower heads, tubesheets and tube-to-tube sheet welds	Cracking due to stress corrosion cracking and primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD) and Water Chemistry and for nickel alloy, FSAR supplement commitment to implement applicable plant commitments to (1) NRC Orders, Bulletins and Generic Letters associated with nickel alloys and (2) staff-accepted industry guidelines.	No, but licensee commitment needs to be confirmed	Consistent with NUREG-1801. Cracking is managed by a combination of the Water Chemistry Program and the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program. The CR-3 commitment is described in the FSAR supplement. Further evaluation is documented in Subsection 3.1.2.2.16.1.
3.1.1-36	Nickel alloy, stainless steel pressurizer spray head	Cracking due to stress corrosion cracking and primary water stress corrosion cracking	Water Chemistry and One-Time Inspection and, for nickel alloy welded spray heads, provide commitment in FSAR supplement to submit AMP delineating commitments to Orders, Bulletins, or Generic Letters that inspect stipulated components for cracking of wetted surfaces.	No, unless licensee commitment needs to be confirmed	This item is not applicable to CR-3. The CR-3 pressurizer spray head has no intended function.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-37	Stainless steel and nickel alloy reactor vessel internals components (e.g., Upper internals assembly, RCCA guide tube assemblies, Lower internal assembly, CEA shroud assemblies, Core shroud assembly, Core support shield assembly, Core barrel assembly, Lower grid assembly, Flow distributor assembly)	Cracking due to stress corrosion cracking, primary water stress corrosion cracking, irradiation-assisted stress corrosion cracking	Water Chemistry and FSAR supplement commitment to (1) participate in industry RVI aging programs (2) implement applicable results (3) submit for NRC approval > 24 months before the extended period an RVI inspection plan based on industry recommendation.	No, but licensee commitment needs to be confirmed	Consistent with NUREG-1801. CR-3 manages cracking with the Water Chemistry Program. The CR-3 commitment is described in the FSAR supplement. Further evaluation is documented in Subsection 3.1.2.2.17.
3.1.1-38	BWR Only				
3.1.1-39	BWR Only				
3.1.1-40	BWR Only				
3.1.1-41	BWR Only				
3.1.1-42	BWR Only				
3.1.1-43	BWR Only				
3.1.1-44	BWR Only				
3.1.1-45	BWR Only				
3.1.1-46	BWR Only				
3.1.1-47	BWR Only				
3.1.1-48	BWR Only				

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-49	BWR Only				
3.1.1-50	BWR Only				
3.1.1-51	BWR Only				
3.1.1-52	Steel and stainless steel reactor coolant pressure boundary (RCPB) pump and valve closure bolting, manway and holding bolting, flange bolting, and closure bolting in high-pressure and high-temperature systems	Cracking due to stress corrosion cracking, loss of material due to wear, loss of preload due to thermal effects, gasket creep, and self-loosening	Bolting Integrity	No	Consistent with NUREG-1801. The CR-3 Bolting Integrity Program addresses aging management requirements for bolting on mechanical components within the scope of License Renewal. The program is based on industry recommendations and EPRI guidance which considers material properties, joint/gasket design, service requirements, and industry/site operating experience in specifying torque and closure requirements, with additional programmatic inspections and requirements as needed to adequately manage aging effects.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-53	Steel piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to general, pitting and crevice corrosion	Closed-Cycle Cooling Water System	No	This item is not applicable to CR-3.
3.1.1-54	Copper alloy piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System	No	This item is not applicable to CR-3.
3.1.1-55	Cast austenitic stainless steel Class 1 pump casings, and valve bodies and bonnets exposed to reactor coolant >250°C (>482°F)	Loss of fracture toughness due to thermal aging embrittlement	Inservice inspection (IWB, IWC, and IWD). Thermal aging susceptibility screening is not necessary, inservice inspection requirements are sufficient for managing these aging effects. ASME Code Case N-481 also provides an alternative for pump casings.	No	Consistent with NUREG-1801. The aging effect is managed by the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program.
3.1.1-56	Copper alloy >15% Zn piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to selective leaching	Selective Leaching of Materials	No	This item is not applicable to CR-3.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-57	Cast austenitic stainless steel Class 1 piping, piping component, and piping elements and control rod drive pressure housings exposed to reactor coolant >250°C (>482°F)	Loss of fracture toughness due to thermal aging embrittlement	Thermal Aging Embrittlement of CASS	No	This item is not applicable to CR-3. Valve bodies and pump casings are adequately covered by existing inspection requirements in Section XI of the ASME Code. Screening for susceptibility to thermal aging is not required and the current ASME Code inspection requirements are sufficient based on the information provided in a letter from C.I. Grimes (USNRC) to D. Walters (NEI), License Renewal Issue No. 98-0030, Thermal Aging Embrittlement of Cast Austenitic Stainless Steel Components, May 19, 2000.
3.1.1-58	Steel reactor coolant pressure boundary external surfaces exposed to air with borated water leakage	Loss of material due to Boric acid corrosion	Boric Acid Corrosion	No	Consistent with NUREG-1801. The aging effect is managed by the Boric Acid Corrosion Program.
3.1.1-59	Steel steam generator steam nozzle and safe end, feedwater nozzle and safe end, AFW nozzles and safe ends exposed to secondary feedwater/steam	Wall thinning due to flow-accelerated corrosion	Flow-Accelerated Corrosion	No	This item is not applicable to CR-3.
3.1.1-60	Stainless steel flux thimble tubes (with or without chrome plating)	Loss of material due to Wear	Flux Thimble Tube Inspection	No	This item is not applicable to CR-3.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-61	Stainless steel, steel pressurizer integral support exposed to air with metal temperature up to 288°C (550°F)	Cracking due to cyclic loading	Inservice Inspection (IWB, IWC, and IWD)	No	Consistent with NUREG-1801. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, will be used to manage cracking due to cyclic loading in the steel pressurizer support plate assemblies exposed to air with metal temperature up to 288°C.
3.1.1-62	Stainless steel, steel with stainless steel cladding reactor coolant system cold leg, hot leg, surge line, and spray line piping and fittings exposed to reactor coolant	Cracking due to cyclic loading	Inservice Inspection (IWB, IWC, and IWD)	No	Consistent with NUREG-1801. The aging effect is managed by the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program.
3.1.1-63	Steel reactor vessel flange, stainless steel and nickel alloy reactor vessel internals exposed to reactor coolant (e.g., upper and lower internals assembly, CEA shroud assembly, core support barrel, upper grid assembly, core support shield assembly, lower grid assembly)	Loss of material due to Wear	Inservice Inspection (IWB, IWC, and IWD)	No	Consistent with NUREG-1801. The aging effect is managed by the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-64	Stainless steel and steel with stainless steel or nickel alloy cladding pressurizer components	Cracking due to stress corrosion cracking, primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD) and Water Chemistry	No	Consistent with NUREG-1801. The aging effect is managed by a combination of the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program and the Water Chemistry Program.
3.1.1-65	Nickel alloy reactor vessel upper head and control rod drive penetration nozzles, instrument tubes, head vent pipe (top head), and welds	Cracking due to primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD) and Water Chemistry and Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors	No	Consistent with NUREG-1801. The aging effect is managed by a combination of the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, Water Chemistry Program and the Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors Program.
3.1.1-66	Steel steam generator secondary manways and handholds (cover only) exposed to air with leaking secondary-side water and/or steam	Loss of material due to erosion	Inservice Inspection (IWB, IWC, and IWD) for Class 2 components	No	Consistent with NUREG-1801. The aging effect is managed by the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program.
3.1.1-67	Steel with stainless steel or nickel alloy cladding; or stainless steel pressurizer components exposed to reactor coolant	Cracking due to cyclic loading	Inservice Inspection (IWB, IWC, and IWD), and Water Chemistry	No	Consistent with NUREG-1801. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program and the Water Chemistry Program are used to manage cracking of the pressurizer.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-68	Stainless steel, steel with stainless steel cladding Class 1 piping, fittings, pump casings, valve bodies, nozzles, safe ends, manways, flanges, CRD housing; pressurizer heater sheaths, sleeves, diaphragm plate; pressurizer relief tank components, reactor coolant system cold leg, hot leg, surge line, and spray line piping and fittings	Cracking due to stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD), and Water Chemistry	No	Consistent with NUREG-1801. The aging effect is managed by a combination of the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program and the Water Chemistry Program.
3.1.1-69	Stainless steel, nickel alloy safety injection nozzles, safe ends, and associated welds and buttering exposed to reactor coolant	Cracking due to stress corrosion cracking, primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD), and Water Chemistry	No	Consistent with NUREG-1801. The aging effect is managed by a combination of the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program and the Water Chemistry Program.
3.1.1-70	Stainless steel; steel with stainless steel cladding Class 1 piping, fittings and branch connections < NPS 4 exposed to reactor coolant	Cracking due to stress corrosion cracking, thermal and mechanical loading	Inservice Inspection (IWB, IWC, and IWD), Water chemistry, and One-Time Inspection of ASME Code Class 1 Small-bore Piping	No	Consistent with NUREG-1801. The aging effect is managed by a combination of the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, Water Chemistry Program and the One-Time Inspection of ASME Code Class 1 Small-bore Piping Program.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-71	High-strength low alloy steel closure head stud assembly exposed to air with reactor coolant leakage	Cracking due to stress corrosion cracking; loss of material due to wear	Reactor Head Closure Studs	No	Consistent with NUREG-1801. The aging effects are managed by the Reactor Head Closure Studs Program.
3.1.1-72	Nickel alloy steam generator tubes and sleeves exposed to secondary feedwater/ steam	Cracking due to OD stress corrosion cracking and intergranular attack, loss of material due to fretting and wear	Steam Generator Tube Integrity and Water Chemistry	No	Consistent with NUREG-1801. The aging effects are managed by a combination of the Steam Generator Tube Integrity and the Water Chemistry Programs.
3.1.1-73	Nickel alloy steam generator tubes, repair sleeves, and tube plugs exposed to reactor coolant	Cracking due to primary water stress corrosion cracking	Steam Generator Tube Integrity and Water Chemistry	No	Consistent with NUREG-1801. The aging effect is managed by a combination of the Steam Generator Tube Integrity and the Water Chemistry Programs.
3.1.1-74	Chrome plated steel, stainless steel, nickel alloy steam generator anti-vibration bars exposed to secondary feedwater/ steam	Cracking due to stress corrosion cracking, loss of material due to crevice corrosion and fretting	Steam Generator Tube Integrity and Water Chemistry	No	This item is not applicable to CR-3. This component, material, environment, and aging effect/ mechanism combination does not apply to CR-3 steam generators.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-75	Nickel alloy once-through steam generator tubes exposed to secondary feedwater/ steam	Denting due to corrosion of carbon steel tube support plate	Steam Generator Tube Integrity and Water Chemistry	No	Consistent with NUREG-1801. The aging effect is managed by a combination of the Steam Generator Tube Integrity Program and the Water Chemistry Programs.
3.1.1-76	Steel steam generator tube support plate, tube bundle wrapper exposed to secondary feedwater/steam	Loss of material due to erosion, general, pitting, and crevice corrosion, ligament cracking due to corrosion	Steam Generator Tube Integrity and Water Chemistry	No	Consistent with NUREG-1801. Ligament cracking due to corrosion of the tube support plate is managed by a combination of the Steam Generator Tube Integrity Program and the Water Chemistry Program.
3.1.1-77	Nickel alloy steam generator tubes and sleeves exposed to phosphate chemistry in secondary feedwater/ steam	Loss of material due to wastage and pitting corrosion	Steam Generator Tube Integrity and Water Chemistry	No	This item is not applicable to CR-3. CR-3 does not use phosphate chemistry.
3.1.1-78	Steel steam generator tube support lattice bars exposed to secondary feedwater/ steam	Wall thinning due to flow-accelerated corrosion	Steam Generator Tube Integrity and Water Chemistry	No	This item is not applicable to CR-3. The CR-3 steam generators do not have lattice bars.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-79	Nickel alloy steam generator tubes exposed to secondary feedwater/ steam	Denting due to corrosion of steel tube support plate	Steam Generator Tube Integrity; Water Chemistry and, for plants that could experience denting at the upper support plates, evaluate potential for rapidly propagating cracks and then develop and take corrective actions consistent with Bulletin 88-02.	No	This item is not applicable to CR-3. This component, material, environment, and aging effect/ mechanism combination does not apply to CR-3 steam generator tubes.
3.1.1-80	Cast austenitic stainless steel reactor vessel internals (e.g., upper internals assembly, lower internal assembly, CEA shroud assemblies, control rod guide tube assembly, core support shield assembly, lower grid assembly)	Loss of fracture toughness due to thermal aging and neutron irradiation embrittlement	Thermal Aging and Neutron Irradiation Embrittlement of CASS	No	Consistent with NUREG-1801. The aging effect is managed by the Thermal Aging and Neutron Irradiation Embrittlement of CASS Program.
3.1.1-81	Nickel alloy or nickel-alloy clad steam generator divider plate exposed to reactor coolant	Cracking due to primary water stress corrosion cracking	Water Chemistry	No	This item is not applicable to CR-3. This component, material, environment, and aging effect/ mechanism combination does not apply to CR-3 steam generators.
3.1.1-82	Stainless steel steam generator primary side divider plate exposed to reactor coolant	Cracking due to stress corrosion cracking	Water Chemistry	No	This item is not applicable to CR-3. This component, material, environment, and aging effect/ mechanism combination does not apply to CR-3 steam generators.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-83	Stainless steel; steel with nickel-alloy or stainless steel cladding; and nickel-alloy reactor vessel internals and reactor coolant pressure boundary components exposed to reactor coolant	Loss of material due to pitting and crevice corrosion	Water Chemistry	No	Consistent with NUREG-1801. The aging effect is managed by the Water Chemistry Program.
3.1.1-84	Nickel alloy steam generator components such as, secondary side nozzles (vent, drain, and instrumentation) exposed to secondary feedwater/ steam	Cracking due to stress corrosion cracking	Water Chemistry and One-Time Inspection or Inservice Inspection (IWB, IWC, and IWD).	No	Consistent with NUREG-1801. The aging effect is managed by the Water Chemistry Program and the One-Time Inspection Program or ASME Section XI Inservice Inspection Program, Subsections IWB, IWC, and IWD Program.
3.1.1-85	Nickel alloy piping, piping components, and piping elements exposed to air – indoor uncontrolled (external)	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.1.1-86	Stainless steel piping, piping components, and piping elements exposed to air – indoor uncontrolled (External); air with borated water leakage; concrete; gas	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.1.1-87	Steel piping, piping components, and piping elements in concrete	None	None	NA - No AEM or AMP	This item is not applicable to CR-3. CR-3 has no components within the scope of license renewal in concrete in the reactor vessel, internals, and reactor coolant systems, so the applicable NUREG-1801 line was not used.

TABLE 3.1.2-1 REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Closure Head Dome	M-1	Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	C
				Cracking due to Cyclic Loading	TLAA	IV.A2-22 (R-85)	3.1.1-21	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A
Reactor Vessel; Closure Head Lifting Lugs	M-4	Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-20 (R-70)	3.1.1-01	A
Reactor Vessel; Closure Head Flange	M-1	Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Closure Head Flange (continued)	M-1	Low Alloy Steel with Stainless Steel Cladding	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A
Reactor Vessel; Closure Head Stud Assembly	M-1	High Strength Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A
				Cracking due to SCC	Reactor Head Closure Studs	IV.A2-2 (R-71)	3.1.1-71	A
				Loss of Material due to Wear	Reactor Head Closure Studs	IV.A2-3 (R-72)	3.1.1-71	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-4 (R-73)	3.1.1-07	A
Reactor Vessel; Vessel Flange Leak Detection Line	M-1	Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	IV.A2-5 (R-74)	3.1.1-23	E
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Vessel Flange Leak Detection Line Tap Weld	M-1	Nickel Base Alloys	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking due to SCC	Water Chemistry, One-Time Inspection, and Nickel-Alloy Commitment	IV.C2-17 (R-224)	3.1.1-36	C
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A
Reactor Vessel; CRDM Nozzle Body	M-1	Nickel Base Alloys	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Penetration Nozzles Welded to the Upper reactor Vessel Closure Heads of Pressurized Water Reactors	IV.A2-9 (R-75)	3.1.1-65	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; CRDM Nozzle Body (continued)	M-1	Nickel Base Alloys	Reactor Coolant (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A
Reactor Vessel; CRDM Nozzle Adapter Flange	M-1	Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; CRDM Nozzle Body to Nozzle Adapter Flange Weld	M-1	Nickel Base Alloys	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Penetration Nozzles Welded to the Upper reactor Vessel Closure Heads of Pressurized Water Reactors	IV.A2-9 (R-75)	3.1.1-65	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A
Reactor Vessel; CRDM Head Penetration Flange Bolting	M-1	Stainless Steel	Air - Indoor Uncontrolled (Outside)	Cracking due to SCC	Bolting Integrity	IV.A2-6 (R-78)	3.1.1-52	A
				Loss of Material due to Wear	Bolting Integrity	IV.A2-7 (R-79)	3.1.1-52	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	IV.A2-8 (R-80)	3.1.1-52	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-10 (R-18)	3.1.1-07	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Inlet and Outlet Nozzles	M-1	Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A
Reactor Vessel; Core Flood Nozzles	M-1	Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Core Flood Nozzle Flow Restrictors	M-3	Stainless Steel	Reactor Coolant (Outside)	Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-15 (R-83)	3.1.1-69	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
Reactor Vessel; Core Flood Nozzle Safe Ends	M-1	Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-15 (R-83)	3.1.1-69	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Core Flood Nozzle Weld	M-1	Nickel Base Alloys	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Commitment	IV.A2-15 (R-83)	3.1.1-69	E, 101
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A
Reactor Vessel; Upper Nozzle Belt Forging	M-1	Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Lower Nozzle Belt Forging	M-1	Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	C
				Cracking due to Cyclic Loading	TLAA	IV.A2-22 (R-85)	3.1.1-21	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Reactor Coolant and Neutron Flux (Inside)	Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	TLAA	IV.A2-23 (R-84)	3.1.1-17	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	Reactor Vessel Surveillance	IV.A2-24 (R-86)	3.1.1-18	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Upper Shell Plate	M-1	Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Reactor Coolant and Neutron Flux (Inside)	Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	TLAA	IV.A2-23 (R-84)	3.1.1-17	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	Reactor Vessel Surveillance	IV.A2-24 (R-86)	3.1.1-18	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A
Reactor Vessel; Lower Shell Plate	M-1	Low Alloy Steel with Nickel Base Alloy Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Lower Shell Plate (continued)	M-1	Low Alloy Steel with Nickel Base Alloy Cladding	Reactor Coolant and Neutron Flux (Inside)	Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	TLAA	IV.A2-23 (R-84)	3.1.1-17	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	Reactor Vessel Surveillance	IV.A2-24 (R-86)	3.1.1-18	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A
		Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Reactor Coolant and Neutron Flux (Inside)	Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	TLAA	IV.A2-23 (R-84)	3.1.1-17	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	Reactor Vessel Surveillance	IV.A2-24 (R-86)	3.1.1-18	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Beltline Welds	M-1	Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Reactor Coolant and Neutron Flux (Inside)	Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	TLAA	IV.A2-23 (R-84)	3.1.1-17	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	Reactor Vessel Surveillance	IV.A2-24 (R-86)	3.1.1-18	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A
Reactor Vessel; Upper Shell Flange	M-1	Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	C
				Cracking due to Cyclic Loading	TLAA	IV.A2-22 (R-85)	3.1.1-21	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Upper Shell Flange (continued)	M-1	Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Loss of Material due to Wear	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.A2-25 (R-87)	3.1.1-63	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A
Reactor Vessel; Dutchman Forging	M-1	Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Dutchman Forging (continued)	M-4	Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A
Reactor Vessel; Bottom Head	M-1	Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Core Guide Lugs	M-10	Nickel Base Alloys	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Commitment	IV.A2-12 (R-88)	3.1.1-31	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
Reactor Vessel; Instrument Tubes (Bottom Head)	M-1	Nickel Base Alloys	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to Flow Induced Vibration	TLAA	IV.A2-21 (R-219)		H, 102
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Commitment	IV.A2-19 (R-89)	3.1.1-31	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Head Vent Pipe	M-1	Nickel Base Alloys	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Penetration Nozzles Welded to the Upper reactor Vessel Closure Heads of Pressurized Water Reactors	IV.A2-18 (R-90)	3.1.1-65	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A
		Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-15 (R-83)	3.1.1-69	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Head Vent Pipe (continued)	M-1	Stainless Steel	Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Reactor Vessel; Support Skirt	M-4	Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-20 (R-70)	3.1.1-01	A
Reactor Vessel Internals; Plenum Cover Assembly	M-9	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-34 (R-172)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-35 (R-174)	3.1.1-33	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Plenum Cylinder	M-9	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-34 (R-172)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-35 (R-174)	3.1.1-33	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A
Reactor Vessel Internals; Reinforcing Plates	M-9	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-34 (R-172)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-35 (R-174)	3.1.1-33	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Top Flange-to-Cover Bolts	M-9	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-36 (R-173)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-35 (R-174)	3.1.1-33	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A
Reactor Vessel Internals; Bottom Flange-to-Upper Grid Screws	M-9	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-36 (R-173)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-35 (R-174)	3.1.1-33	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Plenum Rib Pads	M-9	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-44 (R-175)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-45 (R-177)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-46 (R-178)	3.1.1-22	A
				Loss of Material due to Wear	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.B4-42 (R-179)	3.1.1-63	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Upper Grid Rib Section	M-9	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-44 (R-175)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-45 (R-177)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-46 (R-178)	3.1.1-22	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Upper Grid Rib Forging	M-9	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-44 (R-175)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-45 (R-177)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-46 (R-178)	3.1.1-22	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Fuel Assembly Support Pads (Upper Grid Assembly)	M-9	Nickel Base Alloys	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-44 (R-175)		F
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-45 (R-177)		F
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-46 (R-178)		F
				Loss of Material due to Wear	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.B4-42 (R-179)		F
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Fuel Assembly Support Pads (Upper Grid Assembly) (continued)	M-9	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-44 (R-175)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-45 (R-177)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-46 (R-178)	3.1.1-22	A
				Loss of Material due to Wear	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.B4-42 (R-179)	3.1.1-63	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Rib-to-Ring Screws	M-9	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-43 (R-176)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-45 (R-177)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-46 (R-178)	3.1.1-22	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A
Reactor Vessel Internals; CRGT Pipe and Flange	M-9	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-2 (R-180)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-3 (R-182)	3.1.1-33	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; CRGT Spacer Casting	M-9	Cast Austenitic Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-2 (R-180)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-3 (R-182)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Thermal Embrittlement	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)	IV.B4-4 (R-183)	3.1.1-80	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; CRGT Spacer Screws	M-9	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-5 (R-181)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-3 (R-182)	3.1.1-33	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A
Reactor Vessel Internals; CRGT Flange-to-Upper Grid Screws	M-9	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-5 (R-181)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-3 (R-182)	3.1.1-33	A
				Loss of Preload due to Stress Relaxation	Reactor Vessel Internals Commitment	IV.B4-6 (R-184)	3.1.1-27	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; CRGT Rod Guide Tubes	M-9	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-2 (R-180)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-3 (R-182)	3.1.1-33	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A
Reactor Vessel Internals; CRGT Rod Guide Sectors	M-9	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-2 (R-180)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-3 (R-182)	3.1.1-33	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Core Support Shield Cylinder (Top and Bottom Flange)	M-9	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-18 (R-185)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-17 (R-187)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-16 (R-188)	3.1.1-22	A
				Loss of Material due to Wear	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.B4-15 (R-190)	3.1.1-63	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Core Support Shield-to-Core Barrel Bolts	M-9	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-20 (R-186)	3.1.1-37	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-17 (R-187)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-16 (R-188)	3.1.1-22	A
				Loss of Preload due to Stress Relaxation	Reactor Vessel Internals Commitment	IV.B4-19 (R-192)	3.1.1-27	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Outlet and Vent Valve Nozzles	M-10	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-18 (R-185)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-17 (R-187)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-16 (R-188)	3.1.1-22	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Vent Valve Body and Retaining Ring	M-10	Cast Austenitic Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-18 (R-185)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-17 (R-187)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Thermal Embrittlement	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)	IV.B4-21 (R-191)	3.1.1-80	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Vent Valve Body and Retaining Ring (continued)	M-10	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-18 (R-185)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-17 (R-187)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-16 (R-188)	3.1.1-22	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A
Reactor Vessel Internals; Vent Valve Assembly Locking Device	M-10	Nickel Base Alloys	Reactor Coolant (Outside)	Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-20 (R-186)	3.1.1-37	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-17 (R-187)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-16 (R-188)	3.1.1-22	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Vent Valve Assembly Locking Device (continued)	M-10	Nickel Base Alloys	Reactor Coolant (Outside)	Loss of Material due to Wear	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.B4-15 (R-190)		F
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A
		Stainless Steel	Reactor Coolant (Outside)	Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-20 (R-186)	3.1.1-37	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-17 (R-187)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-16 (R-188)	3.1.1-22	A
				Loss of Material due to Wear	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.B4-15 (R-190)	3.1.1-63	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Core Barrel Cylinder (Top and Bottom Flange)	M-9	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-10 (R-193)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-11 (R-195)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-12 (R-196)	3.1.1-22	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Lower Internals Assembly-to-Core Barrel Bolts	M-9	Nickel Base Alloys	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-13 (R-194)	3.1.1-37	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-11 (R-195)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-12 (R-196)	3.1.1-22	A
				Loss of Preload due to Stress Relaxation	Reactor Vessel Internals Commitment	IV.B4-14 (R-197)	3.1.1-27	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Lower Internals Assembly-to-Core Barrel Bolts (continued)	M-9	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-13 (R-194)	3.1.1-37	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-11 (R-195)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-12 (R-196)	3.1.1-22	A
				Loss of Preload due to Stress Relaxation	Reactor Vessel Internals Commitment	IV.B4-14 (R-197)	3.1.1-27	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Core Barrel-to-Thermal Shield Bolts	M-9	Nickel Base Alloys	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to Flow Induced Vibration	TLAA	IV.B4-37 (R-53)		H, 102
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-13 (R-194)	3.1.1-37	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-11 (R-195)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-12 (R-196)	3.1.1-22	A
				Loss of Preload due to Stress Relaxation	Reactor Vessel Internals Commitment	IV.B4-14 (R-197)	3.1.1-27	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Core Barrel-to-Thermal Shield Bolts (continued)	M-9	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to Flow Induced Vibration	TLAA	IV.B4-37 (R-53)		H, 102
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-13 (R-194)	3.1.1-37	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-11 (R-195)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-12 (R-196)	3.1.1-22	A
				Loss of Preload due to Stress Relaxation	Reactor Vessel Internals Commitment	IV.B4-14 (R-197)	3.1.1-27	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Baffle Plates and Formers	M-9	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-10 (R-193)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-11 (R-195)	3.1.1-33	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A
Reactor Vessel Internals; Baffle/Former Bolts and Screws	M-9	Stainless Steel	Reactor Coolant (Outside)	Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-7 (R-125)	3.1.1-30	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-1 (R-128)	3.1.1-22	A
				Loss of Preload due to Stress Relaxation	Reactor Vessel Internals Commitment	IV.B4-9 (R-201)	3.1.1-27	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-8 (R-199)	3.1.1-33	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Baffle/Former Bolts and Screws (continued)	M-9	Stainless Steel	Reactor Coolant (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A
Reactor Vessel Internals; Surveillance Specimen Holder Bolts	M-9	Nickel Base Alloys	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to Flow Induced Vibration	TLAA	IV.B4-37 (R-53)		H, 102
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-13 (R-194)	3.1.1-37	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-11 (R-195)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-12 (R-196)	3.1.1-22	A
				Loss of Preload due to Stress Relaxation	Reactor Vessel Internals Commitment	IV.B4-14 (R-197)	3.1.1-27	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Surveillance Specimen Holder Bolts (continued)	M-9	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to Flow Induced Vibration	TLAA	IV.B4-37 (R-53)		H, 102
				Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-13 (R-194)	3.1.1-37	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-11 (R-195)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-12 (R-196)	3.1.1-22	A
				Loss of Preload due to Stress Relaxation	Reactor Vessel Internals Commitment	IV.B4-14 (R-197)	3.1.1-27	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Lower Grid Rib Section	M-9	Stainless Steel	Reactor Coolant (Outside)	Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-29 (R-202)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-30 (R-204)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-31 (R-205)	3.1.1-22	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Fuel Assembly Support Pads (Lower Grid Assembly)	M-9	Nickel Base Alloys	Reactor Coolant (Outside)	Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-29 (R-202)		F
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-30 (R-204)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-31 (R-205)	3.1.1-22	A
				Loss of Material due to Wear	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.B4-27 (R-208)		F
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Fuel Assembly Support Pads (Lower Grid Assembly) (continued)	M-9	Stainless Steel	Reactor Coolant (Outside)	Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-29 (R-202)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-30 (R-204)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-31 (R-205)	3.1.1-22	A
				Loss of Material due to Wear	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.B4-27 (R-208)	3.1.1-63	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Lower Grid Rib-to-Shell Forging Screws	M-9	Stainless Steel	Reactor Coolant (Outside)	Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-32 (R-203)	3.1.1-37	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-30 (R-204)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-31 (R-205)	3.1.1-22	A
				Loss of Preload due to Stress Relaxation	Reactor Vessel Internals Commitment	IV.B4-33 (R-207)	3.1.1-27	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Lower Grid Flow Distributor Plate	M-9	Stainless Steel	Reactor Coolant (Outside)	Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-29 (R-202)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-30 (R-204)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-31 (R-205)	3.1.1-22	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A
Reactor Vessel Internals; Orifice Plugs	M-9	Stainless Steel	Reactor Coolant (Outside)	Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-29 (R-202)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-30 (R-204)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-31 (R-205)	3.1.1-22	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Orifice Plugs (continued)	M-9	Stainless Steel	Reactor Coolant (Outside)	Cracking due to Flow Induced Vibration	TLAA	IV.B4-37 (R-53)		H, 102
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A
Reactor Vessel Internals; Lower Grid and Shell Forgings	M-9	Stainless Steel	Reactor Coolant (Outside)	Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-29 (R-202)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-30 (R-204)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-31 (R-205)	3.1.1-22	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Lower Internals Assembly-to-Thermal Shield Bolts	M-9	Nickel Base Alloys	Reactor Coolant (Outside)	Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-32 (R-203)	3.1.1-37	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-30 (R-204)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-31 (R-205)	3.1.1-22	A
				Loss of Preload due to Stress Relaxation	Reactor Vessel Internals Commitment	IV.B4-33 (R-207)	3.1.1-27	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to Flow Induced Vibration	TLAA	IV.B4-37 (R-53)		H, 102
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Lower Internals Assembly-to-Thermal Shield Bolts (continued)	M-9	Stainless Steel	Reactor Coolant (Outside)	Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-32 (R-203)	3.1.1-37	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-30 (R-204)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-31 (R-205)	3.1.1-22	A
				Loss of Preload due to Stress Relaxation	Reactor Vessel Internals Commitment	IV.B4-33 (R-207)	3.1.1-27	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to Flow Induced Vibration	TLAA	IV.B4-37 (R-53)		H, 102
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Guide Blocks and Bolts	M-9	Nickel Base Alloys	Reactor Coolant (Outside)	Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-32 (R-203)	3.1.1-37	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-30 (R-204)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-31 (R-205)	3.1.1-22	A
				Loss of Material due to Wear	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.B4-27 (R-208)		F
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Guide Blocks and Bolts (continued)	M-9	Stainless Steel	Reactor Coolant (Outside)	Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-32 (R-203)	3.1.1-37	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-30 (R-204)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-31 (R-205)	3.1.1-22	A
				Loss of Material due to Wear	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.B4-27 (R-208)	3.1.1-63	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Shock Pads and Bolts	M-9	Stainless Steel	Reactor Coolant (Outside)	Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-29 (R-202)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-30 (R-204)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-31 (R-205)	3.1.1-22	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A
Reactor Vessel Internals; Support Post Pipes	M-9	Stainless Steel	Reactor Coolant (Outside)	Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-29 (R-202)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-30 (R-204)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-31 (R-205)	3.1.1-22	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Support Post Pipes (continued)	M-9	Stainless Steel	Reactor Coolant (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A
Reactor Vessel Internals; Incore Guide Tube Spider Castings	M-9	Cast Austenitic Stainless Steel	Reactor Coolant (Outside)	Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-29 (R-202)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-30 (R-204)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Thermal Embrittlement	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)	IV.B4-28 (R-206)	3.1.1-80	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to Flow Induced Vibration	TLAA	IV.B4-37 (R-53)		H, 102
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Incore Guide Tube Components	M-9	Stainless Steel	Reactor Coolant (Outside)	Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-29 (R-202)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-30 (R-204)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-31 (R-205)	3.1.1-22	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.B4-37 (R-53)	3.1.1-05	A
				Cracking due to Flow Induced Vibration	TLAA	IV.B4-37 (R-53)		H, 102
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Flow Distributor Head and Flange	M-9	Stainless Steel	Reactor Coolant (Outside)	Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-22 (R-209)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-23 (R-211)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-24 (R-212)	3.1.1-22	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A
Reactor Vessel Internals; Shell Forging-to-Flow Distributor Bolts	M-9	Stainless Steel	Reactor Coolant (Outside)	Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-25 (R-210)	3.1.1-37	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-23 (R-211)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-24 (R-212)	3.1.1-22	A
				Loss of Preload due to Stress Relaxation	Reactor Vessel Internals Commitment	IV.B4-26 (R-213)	3.1.1-27	A
				Cracking due to Flow Induced Vibration	TLAA	IV.B4-37 (R-53)		H, 102

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Shell Forging-to-Flow Distributor Bolts (continued)	M-9	Stainless Steel	Reactor Coolant (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A
Reactor Vessel Internals; Incore Guide Support Plate	M-9	Stainless Steel	Reactor Coolant (Outside)	Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-22 (R-209)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-23 (R-211)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-24 (R-212)	3.1.1-22	A
				Cracking due to Flow Induced Vibration	TLAA	IV.B4-37 (R-53)		H, 102
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Clamping Ring	M-9	Stainless Steel	Reactor Coolant (Outside)	Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-22 (R-209)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-23 (R-211)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-24 (R-212)	3.1.1-22	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A
Reactor Vessel Internals; Thermal Shield	M-11	Stainless Steel	Reactor Coolant (Outside)	Cracking due to SCC	Water Chemistry and Reactor Vessel Internals Commitment	IV.B4-40 (R-214)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-39 (R-215)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Void Swelling	Reactor Vessel Internals Commitment	IV.B4-41 (R-216)	3.1.1-22	A
				Cracking due to Flow Induced Vibration	TLAA	IV.B4-37 (R-53)		H, 102

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Internals; Thermal Shield (continued)	M-11	Stainless Steel	Reactor Coolant (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B4-38 (RP-24)	3.1.1-83	A
RCPB Piping; Upper and Lower Cold Leg	M-1	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-27 (R-30)	3.1.1-68	A
				Cracking due to Cyclic Loading	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.C2-26 (R-56)	3.1.1-62	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RCPB Piping; Reactor Coolant Pump Safe Ends	M-1	Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-27 (R-30)	3.1.1-68	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
RCPB Piping; Reactor Coolant Pump Safe End Welds	M-1	Nickel Base Alloys	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Commitment	IV.C2-13 (RP-31)	3.1.1-31	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RCPB Piping; Upper and Lower Cold Leg Drain, Instrumentation, and RTE Connections	M-1	Nickel Base Alloys	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Commitment	IV.C2-13 (RP-31)	3.1.1-31	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A
RCPB Piping; Hot Leg	M-1	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-27 (R-30)	3.1.1-68	A
				Cracking due to Cyclic Loading	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.C2-26 (R-56)	3.1.1-62	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RCPB Piping; Hot Leg (continued)	M-1	Carbon Steel with Stainless Steel Cladding	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
RCPB Piping; Flow Meter Assembly	M-1	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-27 (R-30)	3.1.1-68	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
		Nickel Base Alloys	Reactor Coolant (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Commitment	IV.C2-13 (RP-31)	3.1.1-31	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RCPB Piping; Flow Meter Branch Connections	M-1	Nickel Base Alloys	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Commitment	IV.C2-13 (RP-31)	3.1.1-31	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A
RCPB Piping; Hot Leg Instrumentation and RTE Connections	M-1	Nickel Base Alloys	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Commitment	IV.C2-13 (RP-31)	3.1.1-31	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RCPB Piping; Hot Leg High Point Vent Branch Connection	M-1	Nickel Base Alloys	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Commitment	IV.C2-13 (RP-31)	3.1.1-31	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A
RCPB Piping; Surge Line	M-1	Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-27 (R-30)	3.1.1-68	A
				Cracking due to Cyclic Loading	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.C2-26 (R-56)	3.1.1-62	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RCPB Piping; Surge Line (continued)	M-1	Stainless Steel	Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
RCPB Piping; Hot Leg Surge Line Nozzle	M-1	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-27 (R-30)	3.1.1-68	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
RCPB Piping; Hot Leg Surge Line Nozzle Safe End	M-1	Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-27 (R-30)	3.1.1-68	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RCPB Piping; Hot Leg Surge Nozzle Weld	M-1	Nickel Base Alloys	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Commitment	IV.C2-13 (RP-31)	3.1.1-31	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A
RCPB Piping; Spray Line	M-1	Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-27 (R-30)	3.1.1-68	A
				Cracking due to Cyclic Loading	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.C2-26 (R-56)	3.1.1-62	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RCPB Piping; Spray Line (continued)	M-1	Stainless Steel	Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
RCPB Piping; Class 1 piping, fittings and branch connections <NPS 4	M-1	Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC Cracking due to Thermal and Mechanical Loading	ASME Section XI Inservice Inspection, Water Chemistry, and One-Time Inspection of ASME Code Class 1 Small-Bore Piping	IV.C2-1 (R-02)	3.1.1-70	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RCPB Piping; High Point Vent and Post Accident Sampling Flow Restrictors	M-1	Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC Cracking due to Thermal and Mechanical Loading	ASME Section XI Inservice Inspection, Water Chemistry, and One-Time Inspection of ASME Code Class 1 Small-Bore Piping	IV.C2-1 (R-02)	3.1.1-70	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RCPB Piping; High Point Vent and Post Accident Sampling Flow Restrictors (continued)	M-3	Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC Cracking due to Thermal and Mechanical Loading	ASME Section XI Inservice Inspection, Water Chemistry, and One-Time Inspection of ASME Code Class 1 Small-Bore Piping	IV.C2-1 (R-02)	3.1.1-70	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
RCPB Piping; Decay Heat Removal Drop Line	M-1	Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-2 (R-07)	3.1.1-68	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RCPB Piping; Decay Heat Removal Drop Line Nozzle	M-1	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-2 (R-07)	3.1.1-68	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
RCPB Piping; Decay Heat Removal Drop Line Nozzle Weld	M-1	Nickel Base Alloys	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Commitment	IV.C2-13 (RP-31)	3.1.1-31	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A, 105

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RCPB Piping; Decay Heat Removal Drop Line Safe End	M-1	Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-2 (R-07)	3.1.1-68	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
RCPB Piping; Core Flood Line	M-1	Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-2 (R-07)	3.1.1-68	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RCPB Piping; High Pressure Injection System Makeup & Letdown Lines	M-1	Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-2 (R-07)	3.1.1-68	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
RCPB Piping; High Pressure Injection System Makeup & Letdown Line Safe Ends	M-1	Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-2 (R-07)	3.1.1-68	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RCPB Piping; High Pressure Injection System Makeup & Letdown Line Welds	M-1	Nickel Base Alloys	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Commitment	IV.C2-13 (RP-31)	3.1.1-31	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A
RCPB Piping; High Pressure Injection System Makeup Thermal Sleeves	M-6	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-2 (R-07)	3.1.1-68	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Coolant Pump; Casings and Covers	M-1	Cast Austenitic Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Loss of Fracture Toughness due to Thermal Embrittlement	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.C2-6 (R-08)	3.1.1-55	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-5 (R-09)	3.1.1-68	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Reactor Coolant Pump; Thermowells	M-1	Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-5 (R-09)	3.1.1-68	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Coolant Pump; Studs and Nuts	M-1	Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-10 (R-18)	3.1.1-07	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	IV.C2-8 (R-12)	3.1.1-52	A
Reactor Coolant Pump; Thermal Barrier Heat Exchangers	M-1	Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	C
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-5 (R-09)	3.1.1-68	C
			Closed Cycle Cooling Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	D
				Cracking due to SCC	Closed-Cycle Cooling Water System	VII.C2-11 (AP-60)	3.3.1-46	D
Reactor Coolant Pump; Seal Coolers	M-1	Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	D, 103
				Cracking due to SCC	Closed-Cycle Cooling Water System	VII.C2-11 (AP-60)	3.3.1-46	D, 103

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Coolant Pump; Seal Coolers (continued)	M-1	Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	C, 103
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	C, 103
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-2 (R-07)	3.1.1-68	C, 103
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	C, 103
			Closed Cycle Cooling Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	D, 103
				Cracking due to SCC	Closed-Cycle Cooling Water System	VII.C2-11 (AP-60)	3.3.1-46	D, 103

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RCPB Piping; Class 1 Valve Bodies	M-1	Cast Austenitic Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and One-Time Inspection of ASME Code Class 1 Small-Bore Piping	IV.C2-1 (R-02)	3.1.1-70	A
				Loss of Fracture Toughness due to Thermal Embrittlement	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.C2-6 (R-08)	3.1.1-55	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RCPB Piping; Class 1 Valve Bodies (continued)	M-1	Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and One-Time Inspection of ASME Code Class 1 Small-Bore Piping	IV.C2-1 (R-02)	3.1.1-70	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
RCPB Piping; Closure Bolting	M-1	Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-10 (R-18)	3.1.1-07	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	IV.C2-8 (R-12)	3.1.1-52	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RCPB Piping; Closure Bolting (continued)	M-1	Stainless Steel	Air - Indoor Uncontrolled (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-10 (R-18)	3.1.1-07	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	IV.C2-8 (R-12)	3.1.1-52	A
Pressurizer; Shell	M-1	Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-19 (R-25)	3.1.1-64	A
				Cracking due to Cyclic Loading	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-18 (R-58)	3.1.1-67	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer; Lower Head	M-1	Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-19 (R-25)	3.1.1-64	A
				Cracking due to Cyclic Loading	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-18 (R-58)	3.1.1-67	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
Pressurizer; Upper Head	M-1	Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-19 (R-25)	3.1.1-64	A
				Cracking due to Cyclic Loading	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-18 (R-58)	3.1.1-67	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer; Upper Head (continued)	M-1	Low Alloy Steel with Stainless Steel Cladding	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
Pressurizer; Heater Belt Forgings	M-1	Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-19 (R-25)	3.1.1-64	A
				Cracking due to Cyclic Loading	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-18 (R-58)	3.1.1-67	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
Pressurizer; Spray Line Nozzle	M-1	Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-19 (R-25)	3.1.1-64	A
				Cracking due to Cyclic Loading	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-18 (R-58)	3.1.1-67	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer; Spray Line Nozzle (continued)	M-1	Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
Pressurizer; Pressure Relief Nozzle	M-1	Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-19 (R-25)	3.1.1-64	A
				Cracking due to Cyclic Loading	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-18 (R-58)	3.1.1-67	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer; Pressure Relief Nozzle Weld	M-1	Nickel Base Alloys	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A, 105
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A, 105
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Commitment	IV.C2-13 (RP-31)	3.1.1-31	A, 105
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A, 105
Pressurizer; Vent and Sampling Nozzle	M-1	Nickel Base Alloys	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A, 106
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A, 106
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Commitment	IV.C2-21 (R-06)	3.1.1-31	A, 106
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A, 106

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer; Surge Line Nozzle	M-1	Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-19 (R-25)	3.1.1-64	A
				Cracking due to Cyclic Loading	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-18 (R-58)	3.1.1-67	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
Pressurizer; Surge Line Nozzle Thermal Sleeve	M- 6	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-27 (R-30)	3.1.1-68	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer; Spray Line Nozzle Thermal Sleeve	M- 6	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-27 (R-30)	3.1.1-68	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
Pressurizer; Level Sensing Nozzles	M-1	Nickel Base Alloys	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A, 106
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A, 106
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Commitment	IV.C2-21 (R-06)	3.1.1-31	A, 106
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A, 106

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer; Sampling Nozzle	M-1	Nickel Base Alloys	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A, 106
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A, 106
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Commitment	IV.C2-21 (R-06)	3.1.1-31	A, 106
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A, 106
Pressurizer; Thermowell	M-1	Nickel Base Alloys	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A, 106
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A, 106
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Commitment	IV.C2-21 (R-06)	3.1.1-31	A, 106
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A, 106

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer; Spray Line Nozzle Safe End and Weld	M-1	Nickel Base Alloys	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A, 105
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A, 105
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Commitment	IV.C2-13 (RP-31)	3.1.1-31	A, 105
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A, 105
Pressurizer; Surge Line Nozzle Safe End	M-1	Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-27 (R-30)	3.1.1-68	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer; Surge Line Nozzle Safe End Weld	M-1	Nickel Base Alloys	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A, 105
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A, 105
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Commitment	IV.C2-13 (RP-31)	3.1.1-31	A, 105
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A, 105
Pressurizer; Manway	M-1	Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-2 (R-07)	3.1.1-68	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer; Manway Covers/Insert	M-1	Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-10 (R-18)	3.1.1-07	A
		Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-2 (R-07)	3.1.1-68	A
Pressurizer; Manway Studs and Nuts	M-1	Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-10 (R-18)	3.1.1-07	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	IV.C2-8 (R-12)	3.1.1-52	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer; Heater Bundle Cover Plate	M-1	Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-10 (R-18)	3.1.1-07	A
		Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
Pressurizer; Heater Bundle Diaphragm Plate	M-1	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-20 (R-217)	3.1.1-68	A
Pressurizer; Immersion Heater Sheath	M-1	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-20 (R-217)	3.1.1-68	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer; Immersion Heater End Plug	M-1	Stainless Steel	Reactor Coolant (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-20 (R-217)	3.1.1-68	A
Pressurizer; Heater Bundle Studs and Nuts	M-1	Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-10 (R-18)	3.1.1-07	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	IV.C2-8 (R-12)	3.1.1-52	A
Pressurizer; Support Plate Assemblies	M-4	Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-10 (R-18)	3.1.1-07	A
				Cracking due to Cyclic Loading	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.C2-16 (R-19)	3.1.1-61	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steam Generator; Upper and Lower Heads	M-1	Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.D2-3 (R-222)	3.1.1-10	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.D2-4 (R-35)	3.1.1-35	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D2-1 (R-17)	3.1.1-58	A
Steam Generator; Tubesheets	M-1	Low Alloy Steel with Nickel Base Alloy Cladding	Reactor Coolant (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.D2-3 (R-222)	3.1.1-10	A
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Commitment	IV.D2-4 (R-35)	3.1.1-35	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D2-1 (R-17)	3.1.1-58	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steam Generator; Primary Nozzles	M-1	Low Alloy Steel with Stainless Steel Cladding	Reactor Coolant (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.D2-3 (R-222)	3.1.1-10	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.D2-4 (R-35)	3.1.1-35	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D2-1 (R-17)	3.1.1-58	A
Steam Generator; Shell Assembly	M-1	Carbon Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	IV.D2-8 (R-224)	3.1.1-12	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.D2-10 (R-33)	3.1.1-07	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D2-1 (R-17)	3.1.1-58	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steam Generator; Baffle Assemblies	M-4	Carbon Steel	Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	IV.D2-8 (R-224)	3.1.1-12	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.D2-10 (R-33)	3.1.1-07	A
Steam Generator; Main Feedwater Spray Nozzle Flanges	M-1	Carbon Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	IV.D2-8 (R-224)	3.1.1-12	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.D2-10 (R-33)	3.1.1-07	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D2-1 (R-17)	3.1.1-58	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steam Generator; Main Feedwater Nozzle Spray Plates	M-8	Carbon Steel	Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-8 (S-10)	3.4.1-04	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.D2-10 (R-33)	3.1.1-07	A
		Nickel Base Alloys	Treated Water (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.D2-15 (R-46)	3.1.1-06	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	IV.D2-8 (R-224)		F
				Cracking due to SCC	Water Chemistry and One-Time Inspection	IV.D2-9 (R-36)	3.1.1-84	A
Steam Generator; Auxiliary Feedwater Nozzle Flanges	M-1	Carbon Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-38 (S-10)	3.4.1-04	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.G-37 (S-11)	3.4.1-01	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steam Generator; Auxiliary Feedwater Nozzle Thermal Sleeves	M-6	Carbon Steel	Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	IV.D2-8 (R-224)	3.1.1-12	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.D2-10 (R-33)	3.1.1-07	A
		Nickel Base Alloys	Treated Water (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.D2-15 (R-46)	3.1.1-06	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	IV.D2-8 (R-224)		F
				Cracking due to SCC	Water Chemistry and One-Time Inspection	IV.D2-9 (R-36)	3.1.1-84	A
Steam Generator; Auxiliary Feedwater Nozzle Inlet Headers	M-1	Carbon Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-38 (S-10)	3.4.1-04	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.G-37 (S-11)	3.4.1-01	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steam Generator; Main Feedwater Nozzle Inlet Headers	M-1	Carbon Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-8 (S-10)	3.4.1-04	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.D1-7 (S-11)	3.4.1-01	A
				Loss of Material due to FAC	Flow-Accelerated Corrosion	VIII.D1-9 (S-16)	3.4.1-29	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A
Steam Generator; Auxiliary Feedwater and Main Feedwater Closure Bolting	M-1	Carbon Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VIII.H-5 (S-33)	3.4.1-22	A
Steam Generator; Main Feedwater Nozzle Inlet Header Support Plates and Gussets	M-4	Carbon Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D2-1 (R-17)	3.1.1-58	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steam Generator; Steam Outlet Nozzle	M-1	Carbon Steel	Steam (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	IV.D2-8 (R-224)	3.1.1-12	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.D2-10 (R-33)	3.1.1-07	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D2-1 (R-17)	3.1.1-58	A
Steam Generator; Primary Side Drain Nozzles	M-1	Nickel Base Alloys	Reactor Coolant (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Commitment	IV.D2-2 (R-01)	3.1.1-31	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.D2-3 (R-222)	3.1.1-10	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steam Generator; Secondary Side Nozzles (Vent, Drain, and Instrumentation)	M-1	Carbon Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	IV.D2-8 (R-224)	3.1.1-12	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.D2-10 (R-33)	3.1.1-07	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D2-1 (R-17)	3.1.1-58	A
		Nickel Base Alloys	Treated Water (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.D2-15 (R-46)	3.1.1-06	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	IV.D2-8 (R-224)		F
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.D2-9 (R-36)	3.1.1-84	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steam Generator; Primary Manway and Inspection Opening Covers and Backing Plates	M-1	Carbon Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D2-1 (R-17)	3.1.1-58	A
		Stainless Steel	Reactor Coolant (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.D2-3 (R-222)	3.1.1-10	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.D2-4 (R-35)	3.1.1-35	A
Steam Generator; Primary Manway and Inspection Opening Bolting	M-1	Carbon Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D2-1 (R-17)	3.1.1-58	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	IV.D2-6 (R-32)	3.1.1-52	A
Steam Generator; Secondary Manway and Handhole Opening Covers	M-1	Carbon Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	IV.D2-8 (R-224)	3.1.1-12	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.D2-10 (R-33)	3.1.1-07	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steam Generator; Secondary Manway and Handhole Opening Covers (continued)	M-1	Carbon Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D2-1 (R-17)	3.1.1-58	A
				Loss of Material due to Erosion	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.D2-5 (R-31)	3.1.1-66	A
Steam Generator; Secondary Manway and Handhole Opening Bolting	M-1	Carbon Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D2-1 (R-17)	3.1.1-58	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	IV.D2-6 (R-32)	3.1.1-52	A
Steam Generator; Transition Ring and Support Skirt Items	M-4	Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-20 (R-70)	3.1.1-01	C
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D2-1 (R-17)	3.1.1-58	A
Steam Generator; Tubes and Sleeves	M-1	Nickel Base Alloys	Reactor Coolant (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	Steam Generator Tube Integrity and Water Chemistry	IV.D2-14 (R-44)	3.1.1-73	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.D2-15 (R-46)	3.1.1-06	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steam Generator; Tubes and Sleeves (continued)	M-1	Nickel Base Alloys	Treated Water (Outside)	Cracking due to ODSCC	Steam Generator Tube Integrity and Water Chemistry	IV.D2-17 (R-47)	3.1.1-72	A
				Cracking due to IGA	Steam Generator Tube Integrity and Water Chemistry	IV.D2-16 (R-48)	3.1.1-72	A
				Loss of Material due to Fretting Loss of Material due to Wear	Steam Generator Tube Integrity and Water Chemistry	IV.D2-18 (R-49)	3.1.1-72	A
				Denting due to Crevice Corrosion	Steam Generator Tube Integrity and Water Chemistry	IV.D2-13 (R-226)	3.1.1-75	A
	M-5	Nickel Base Alloys	Reactor Coolant (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Steam Generator Tube Integrity and Water Chemistry	IV.D2-14 (R-44)		H, 104
			Treated Water (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Steam Generator Tube Integrity and Water Chemistry	IV.D2-16 (R-48)		H, 104
Steam Generator; Tube Plugs	M-1	Nickel Base Alloys	Reactor Coolant (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	Steam Generator Tube Integrity and Water Chemistry	IV.D2-12 (R-40)	3.1.1-73	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.D2-15 (R-46)	3.1.1-06	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steam Generator; Tube Support Plate Assembly (Tube Support Plates)	M-4	Carbon Steel	Treated Water (Outside)	Ligament Cracking due to General Corrosion	Steam Generator Tube Integrity and Water Chemistry	IV.D2-11 (R-42)	3.1.1-76	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	IV.D2-8 (R-224)	3.1.1-12	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.D2-10 (R-33)	3.1.1-07	A
Steam Generator; Tube Support Plate Assembly (Support Rods)	M-4	Carbon Steel	Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	IV.D2-8 (R-224)	3.1.1-12	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.D2-10 (R-33)	3.1.1-07	A
Steam Generator; Tube Support Plate Assembly (Spacers, Nuts, Keys, and Wedges)	M-4	Carbon Steel	Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	IV.D2-8 (R-224)	3.1.1-12	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	IV.D2-10 (R-33)	3.1.1-07	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Copper and Copper Alloys	Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.C2-5 (AP-47)	3.3.1-26	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Stainless Steel	Lubricating Oil (Inside)	Cracking due to SCC	Lubricating Oil Analysis and One-Time Inspection			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.C2-12 (AP-59)	3.3.1-33	A
			Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-31 (E-12)	3.2.1-48	C
				Cumulative Fatigue Damage due to Fatigue	TLAA	V.D1-27 (E-13)	3.2.1-01	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	C
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Expansion Joint	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-31 (E-12)	3.2.1-48	C
				Cumulative Fatigue Damage due to Fatigue	TLAA	V.D1-27 (E-13)	3.2.1-01	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	C
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Flexible Metal Hose	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-31 (E-12)	3.2.1-48	C
				Cumulative Fatigue Damage due to Fatigue	TLAA	V.D1-27 (E-13)	3.2.1-01	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	C
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Coolant Pump; Motor Air Cooling Heat Exchangers	M-1	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	D
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
Reactor Coolant Pump; Motor Lower Bearing Cooling Coils	M-1	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	D
			Lubricating Oil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.C2-5 (AP-47)	3.3.1-26	C

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Coolant Pump; Oil Lift Pumps	M-1	Carbon or Low Alloy Steel	Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.C2-13 (AP-30)	3.3.1-14	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Reactor Coolant Pump; Motor Upper Bearing Cooling Heat Exchangers	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	D
			Lubricating Oil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.C2-5 (AP-47)	3.3.1-26	C

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Insulation (Reactor Vessel and Piping)	M-6	Stainless Steel	Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-2 REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL ROD DRIVE CONTROL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
CRDM Closure Insert and Vent Assemblies	M-1	Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
CRDM Motor Tube Assembly	M-1	Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-2 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL ROD DRIVE CONTROL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
CRDM Stator Cooling Water Flexible Metal Hose	M-1	Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
				Cracking due to SCC	Closed-Cycle Cooling Water System	VII.C2-11 (AP-60)	3.3.1-46	B
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
CRDM Stator Cooling Water Jacket Assemblies	M-1	Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
				Cracking due to SCC	Closed-Cycle Cooling Water System	VII.C2-11 (AP-60)	3.3.1-46	B
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.1.2-3 REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – INCORE MONITORING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Incore Monitoring System Lines	M-1	Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-10 (R-18)	3.1.1-07	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC Cracking due to Thermal and Mechanical Loading	ASME Section XI Inservice Inspection, Water Chemistry, and One-Time Inspection of ASME Code Class 1 Small-Bore Piping	IV.C2-1 (R-02)	3.1.1-70	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

Notes for Tables 3.1.2-1 through 3.1.2-3:

Generic Notes:

A. Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B. Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C. Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D. Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E. Consistent with NUREG-1801 item for material, environment, and aging effect, but a different AMP is credited or NUREG-1801 identifies a plant-specific AMP.
F. Material not in NUREG-1801 for this component.
G. Environment not in NUREG-1801 for this component and material.
H. Aging effect not in NUREG-1801 for this component, material and environment combination.
I. Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J. Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant-specific Notes:

101. Although NUREG-1801 does not require a nickel alloy licensee commitment, the Core Flood Nozzle Weld is currently included in the CR-3 Alloy 600 program.
102. Flow Induced Vibration of the Reactor Vessel Internals has been identified as a TLAA for CR-3. BAW-10051A, Supplement 1, addresses 40 years of operation and is the basis.
103. The seal heat exchanger is an external tube-in-tube design where reactor coolant passes through the inner tube and Nuclear Services Closed Cycle Cooling System fluid passes through the outer tube.
104. NUREG-1801 does not identify fouling of the steam generator tubes as an applicable aging effect. No CR-3 operating experience has been identified for fouling of steam generator tubes. The absence of fouling is considered largely due to the plant water chemistry program.
105. A weld overlay has been applied at this dissimilar metal weld.
106. Alloy 600 remediation has been performed on this component.

3.2 AGING MANAGEMENT OF ENGINEERED SAFETY FEATURES

3.2.1 INTRODUCTION

Section 3.2 provides the results of the aging management reviews (AMRs) for those components in those systems addressed in Subsection 2.3.2, Engineered Safety Features, subject to aging management review. The systems or portions of systems are described in the indicated subsections.

1. Reactor Building (RB) Spray System (Subsection 2.3.2.1)

2. Core Flood System (Subsection 2.3.2.2)

3. Decay Heat Removal System (Subsection 2.3.2.3)

4. Engineered Safeguards Actuation System (As discussed in Subsection 2.3.2.4, this system contains no mechanical components/commodities requiring aging management review.)

5. RB Isolation System (As discussed in Subsection 2.3.2.5, this system has no unique components requiring aging management).

Table 3.2.1, Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features, provides the summary of the programs evaluated in NUREG-1801 that are applicable to component/commodity groups in this Section. Table 3.2.1 uses the format of Table 1 described in Section 3.0 above.

3.2.1.1 Operating Experience

The AMR methodology applied at CR-3 included use of operating experience (OE) to confirm the set of aging effects that had been predicted through material/environment evaluations. Plant-specific and industry OE was identified and reviewed in conjunction with the aging management review. The OE review consisted of the following:

Site: CR-3 site-specific OE has been captured by a review of Licensee Event Reports and other docketed information, site Action Requests (ARs), Maintenance Rule Database, System notebooks, and other relevant information. The site-specific OE review identified no unique or unpredicted aging effects requiring management.

Industry: Industry OE has been captured in NUREG-1801, "Generic Aging Lessons Learned (GALL)," and is the primary method for verifying that a complete set of potential aging effects is identified. An evaluation of industry OE published since the effective date of NUREG-1801 was performed to identify any additional aging effects requiring management. This was performed using Progress Energy internal OE review process which directs the review of OE and requires that it be screened and evaluated for site applicability. OE sources subject to review include INPO and WANO items, NRC documents (Information Notices, Generic Letters, Notices of Violation, and staff reports), 10 CFR 21 reports, and vendor bulletins, as well as corporate internal OE information from Progress Energy nuclear sites. Cracking due to Stress Corrosion Cracking has been identified as an aging effect/mechanism requiring management for the Core Flood Tank cladding and stainless steel nozzles, as well as Inconel welds.

On-Going On-going review of plant-specific and industry operating experience is continuing to be performed in accordance with the Corrective Action Program and the Progress Energy internal OE review process.

3.2.2 RESULTS

The following tables summarize the results of the aging management review for systems in the Engineered Safety Features area.

Table 3.2.2-1 Engineered Safety Features – Summary of Aging Management Evaluation – Reactor Building Spray System

Table 3.2.2-2 Engineered Safety Features – Summary of Aging Management Evaluation – Core Flood System

Table 3.2.2-3 Engineered Safety Features – Summary of Aging Management Evaluation – Decay Heat Removal System

These tables use the format of Table 2 described in Section 3.0 above.

3.2.2.1 Materials, Environment, Aging Effects Requiring Management and Aging Management Programs

The materials from which specific components/commodities are fabricated, the environments to which they are exposed, the aging effects requiring management, and the aging management programs used to manage these aging effects are provided for each of the above systems in the following subsections.

3.2.2.1.1 RB Spray System

Materials

The materials of construction for the RB Spray System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)

- Copper and Copper Alloys
- Stainless Steel

Environment

The RB Spray System components are exposed to the following:
- Air - Indoor Uncontrolled
- Air - Outdoor
- Closed-Cycle Cooling Water
- Dried Air
- Dry Gas
- Raw Water
- Treated Water

Aging Effects Requiring Management

The following RB Spray System aging effects require management:
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the RB Spray System components:
- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Water Chemistry Program

3.2.2.1.2 Core Flood System

Materials

The materials of construction for the Core Flood System components are:
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Cast Austenitic Stainless Steel
- Copper and Copper Alloys
- Insulation
- Nickel Base Alloys
- Stainless Steel

Environment

The Core Flood System components are exposed to the following:

- Air - Indoor Uncontrolled
- Dried Air
- Dry Gas
- Reactor Coolant
- Treated Water

Aging Effects Requiring Management

The following Core Flood System aging effects require management:

- Cracking
- Cumulative Fatigue Damage
- Loss of Fracture Toughness
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Core Flood System components:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program
- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Nickel Alloy Commitment
- Water Chemistry Program

3.2.2.1.3 <u>Decay Heat Removal System</u>

Materials

The materials of construction for the Decay Heat Removal System components are:

- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Cast Austenitic Stainless Steel
- Insulation
- Stainless Steel

Environment

The Decay Heat Removal System components are exposed to the following:

- Air - Indoor Uncontrolled
- Air - Outdoor
- Closed-Cycle Cooling Water
- Reactor Coolant
- Treated Water

Aging Effects Requiring Management

The following Decay Heat Removal System aging effects require management:

- Cracking
- Cumulative Fatigue Damage
- Loss of Fracture Toughness
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Decay Heat Removal System components:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program
- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System Program
- External Surfaces Monitoring Program
- One-Time Inspection Program
- Water Chemistry Program

3.2.2.2 Further Evaluation of Aging Management as Recommended by NUREG-1801

NUREG-1801 identifies aging management activities that warrant further evaluation. For the Engineered Safety Features, those activities are addressed in the following subsections.

3.2.2.2.1 Cumulative Fatigue Damage

Fatigue is a TLAA as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c)(1). The evaluation of this TLAA is addressed separately in Section 4.3.

3.2.2.2.2 Loss of Material Due to Cladding Breach

Loss of Material due to cladding breach could occur for PWR pump casings with stainless steel cladding subjected to borated water. NRC Information Notice 94-63 alerted all holders of operating licenses or construction permits to the potential for significant damage that could result from corrosion of reactor system components caused by cracking of the stainless steel cladding. The description of the circumstances surrounding this information notice is as follows:

> During July and August 1993 the Virginia Electric Power Company discovered severe corrosion damage of the carbon steel casing of a high head safety injection pump at North Anna Unit 1. The damage was caused by cracks through the stainless steel cladding in the pump that allowed corrosive attack by the boric acid coolant. The cracks were discovered when the pump was disassembled for maintenance and rust was observed on the otherwise shiny surface of the cladding in the discharge section of the pump.

The charging pumps at CR-3 are fabricated from stainless steel and not from carbon steel with stainless steel cladding. Therefore, loss of material due to cladding breach is not applicable for CR-3.

3.2.2.2.3 Loss of Material Due to Pitting and Crevice Corrosion

3.2.2.2.3.1 Containment Isolation Piping and Component Internal Surfaces

The internal surfaces of containment isolation piping and components exposed to treated water are evaluated with their parent system. If loss of material due to pitting and crevice corrosion is applicable, an appropriate aging management program is credited.

3.2.2.2.3.2 External Surfaces of Piping, Piping Components, and Piping Elements Exposed to Soil

Loss of material due to pitting and crevice corrosion is possible for stainless steel piping, piping components, and piping elements exposed to soil. The ESF Systems at CR-3 do not contain piping components exposed to soil. Therefore, this item is not applicable to CR-3.

3.2.2.2.3.3 BWR Piping, Piping Components, and Piping Elements Exposed to Treated Water

Loss of material for BWR piping components is applicable to BWR plants only.

3.2.2.2.3.4 Piping, Piping Components, and Piping Elements Exposed to Lubricating Oil

Loss of material from pitting and crevice corrosion could occur for stainless steel, and copper alloy piping, piping components, and piping elements exposed to lubricating oil. The applicable CR-3 components exposed to lubricating oil are associated with the Make Up & Purification System. Loss of material of these components is managed using the Lubricating Oil Analysis Program, augmented by the One-Time Inspection Program to verify program effectiveness. The components are evaluated as part of the Make Up & Purification System in Section 3.3.

3.2.2.2.3.5 Partially Encased Tanks with a Breached Moisture Barrier

Leaking perimeter seals could result in corrosion of external surfaces of the Borated Water Storage Tank (BWST). The external surface of the shell of the BWST has a 1 in. gap filled with styrofoam encased in concrete up to the upper dome. A caulked seal around the perimeter of the tank at the top of the encasement prevents water intrusion to the outside surface of the tank wall. CR-3 manages cracking of the perimeter seal of the BWST with the Structures Monitoring Program to verify that unacceptable degradation is not occurring. See Table 3.5.1 Item 3.5.1-44.

3.2.2.2.3.6 Piping, Piping Components, and Piping Element Internal Surfaces

This subsection discusses the potential for loss of material on the internal surfaces of piping components due to condensation in Emergency Core Cooling and Containment Spray Systems. This aging effect has been predicted for surfaces prone to condensation or periodic wetting, such as the inside of tanks and connected piping. The RB Spray piping inside containment is not considered susceptible to condensation as it is verified drained, is not subject to wetting by system operation, and is kept in standby at ambient conditions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program will be used to perform inspections of abandoned chemical additive piping and components in the RB Spray System that were put in lay-up with demineralized water. The Water Chemistry Program is credited with aging management of pitting and crevice corrosion of internal surfaces and connected piping for the BWST. The Water Chemistry Program will control chemical contaminants that could concentrate at the liquid/air interface in the BWST, where potential for corrosion is highest. The One-Time Inspection Program will verify the effectiveness of the Water Chemistry Program.

3.2.2.2.4 Reduction of Heat Transfer Due to Fouling

3.2.2.2.4.1 Heat Exchanger Tubes Exposed to Lubricating Oil

Reduction of heat transfer due to fouling could occur for steel, stainless steel, and copper alloy heat exchanger tubes exposed to lubricating oil. A combination of the Lubricating Oil Analysis and the One-Time Inspection Programs is used to manage this aging effect. The Lubricating Oil Analysis Program is used to maintain oil systems contaminants (primarily water and particulates) within acceptable limits, thereby preserving an environment that is not conducive to loss of material, cracking or reduction of heat transfer. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation. The applicable CR-3 components include the HPI Makeup Pump Gearbox and Lube Oil Cooler tubes associated with the Make Up & Purification System. The components are evaluated as part of the Make Up & Purification System in Section 3.3.

3.2.2.2.4.2 Heat Exchanger Tubes Exposed to Treated Water

CR-3 manages reduction of heat transfer due to fouling for stainless steel heat exchanger tubes exposed to treated water with a combination of the Water Chemistry Program and the One-Time Inspection Program. The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the mitigation of reduction of heat transfer due to fouling. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.2.2.2.5 Hardening and Loss of Strength Due to Elastomer Degradation in a BWR Standby Gas Treatment System

Hardening and loss of strength due to elastomer degradation in elastomer seals associated with the BWR Standby Gas Treatment System ductwork and filters are applicable to BWR plants only.

3.2.2.2.6 Loss of Material Due to Erosion

Loss of material due to erosion could occur in the stainless steel HPI Make Up (Charging) Pump miniflow recirculation orifice plates exposed to treated borated water. CR-3 manages loss of material due to erosion of the stainless steel HPI Make Up Pump miniflow recirculation orifice plates with the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program includes visual inspections to assure that existing environmental conditions are not causing material degradation that could result in a loss of component intended functions.

3.2.2.2.7 Loss of Material Due to General Corrosion and Fouling

Loss of material due to general corrosion and fouling for BWR steel drywell and suppression chamber spray system nozzle and flow orifice internal surfaces is applicable to BWR plants only.

3.2.2.2.8 Loss of Material Due to General, Pitting, and Crevice Corrosion

3.2.2.2.8.1 BWR Piping, Piping Components, and Piping Elements exposed to Treated Water

Loss of material due to general, pitting, and crevice corrosion for BWR steel piping components exposed to treated water is applicable to BWR plants only.

3.2.2.2.8.2 Internal Surfaces of Containment Isolation Components

Loss of material due to general, pitting, and crevice corrosion is possible for the internal surfaces of containment isolation piping, piping components, and piping elements exposed to treated water. The internal surfaces of containment isolation piping and components exposed to treated water are evaluated with their parent system. If loss of material due to pitting and crevice corrosion is applicable, an appropriate aging management program is credited.

3.2.2.2.8.3 Piping, Piping Components, and Piping Elements Exposed to Lubricating Oil

Loss of material due to general, pitting, and crevice corrosion could occur for steel piping, piping components, and piping elements exposed to lubricating oil. The applicable CR-3 components exposed to lubricating oil are associated with the Make Up & Purification System. Loss of material of these components is managed using the Lubricating Oil Analysis Program augmented by the One-Time Inspection Program to verify program effectiveness. The components are evaluated as part of the Make Up & Purification System in Section 3.3.

3.2.2.2.9 External Surfaces of Piping, Piping Components, and Piping Elements Exposed to Soil

Loss of material due to general, pitting, crevice, and MIC could occur for steel piping, piping components, and piping elements buried in soil regardless of the presence pipe coating or wrapping. The ESF Systems at CR-3 do not contain piping components exposed to soil. Therefore, this item is not applicable to CR-3.

3.2.2.2.10 Quality Assurance for Aging Management of Non-Safety Related Components

QA provisions applicable to License Renewal are discussed in Section B.1.3.

3.2.2.3 Time-Limited Aging Analysis

The Time-Limited Aging Analyses (TLAA) identified below are associated with the ESF systems components. The subsection of the application that contains the TLAA review results is indicated in parenthesis.

1. Metal Fatigue (Section 4.3)

3.2.3 CONCLUSIONS

The Engineered Safety Features components/commodities having aging effects requiring management have been evaluated, and aging management programs have been selected to manage the aging effects. A description of the aging management programs is provided in Appendix B, along with a demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the demonstration provided in Appendix B, the effects of aging will be adequately managed so that there is reasonable assurance that the intended functions of Engineered Safety Features components/commodities will be maintained consistent with the current licensing basis during the period of extended operation.

TABLE 3.2.1 SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER V OF NUREG-1801 FOR ENGINEERED SAFETY FEATURES

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1-01	Steel and stainless steel piping, piping components, and piping elements in emergency core cooling system	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue of metal components is addressed as a TLAA. Further evaluation is documented in Subsection 3.2.2.2.1.
3.2.1-02	Steel with stainless steel cladding pump casing exposed to treated borated water	Loss of material/ cladding breach	A plant-specific aging management program is to be evaluated. Reference NRC Information Notice 94-63, "Boric Acid Corrosion of Charging Pump Casings Caused by Cladding Cracks."	Yes, verify that plant-specific program addresses cladding breach	This item is not applicable to CR-3. The charging pumps at CR-3 are fabricated from stainless steel and not from carbon steel with stainless steel cladding. Further evaluation is documented in Subsection 3.2.2.2.2.
3.2.1-03	Stainless steel containment isolation piping and components internal surfaces exposed to treated water	Loss of material due to pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. The internal surfaces of containment isolation piping and components exposed to treated water are evaluated with their parent system. Further evaluation is documented in Subsection 3.2.2.2.3.1.
3.2.1-04	Stainless steel piping, piping components, and piping elements exposed to soil	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific	This item is not applicable as documented in Subsection 3.2.2.2.3.2.
3.2.1-05	BWR Only				

TABLE 3.2.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER V OF NUREG-1801 FOR ENGINEERED SAFETY FEATURES

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1-06	Stainless steel and copper alloy piping, piping components, and piping elements exposed to lubricating oil	Loss of material due to pitting and crevice corrosion	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	This item is applicable to components in the Make Up & Purification System. The Make Up & Purification System is evaluated in Section 3.3. Further evaluation is documented in Subsection 3.2.2.2.3.4.
3.2.1-07	Partially encased stainless steel tanks with breached moisture barrier exposed to raw water	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated for pitting and crevice corrosion of tank bottoms because moisture and water can egress under the tank due to cracking of the perimeter seal from weathering.	Yes, plant specific	Further evaluation is documented in Subsection 3.2.2.2.3.5.
3.2.1-08	Stainless steel piping, piping components, piping elements, and tank internal surfaces exposed to condensation (internal)	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific	Either the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program or the Water Chemistry Program augmented by the One Time Inspection Program is credited with managing this aging effect. Further evaluation is documented in Subsection 3.2.2.2.3.6.

TABLE 3.2.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER V OF NUREG-1801 FOR ENGINEERED SAFETY FEATURES

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1-09	Steel, stainless steel, and copper alloy heat exchanger tubes exposed to lubricating oil	Reduction of heat transfer due to fouling	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	This item is applicable to HPI Makeup Pump Gearbox and Lube Oil Cooler components in the Make Up & Purification System. The Make Up & Purification System is evaluated in Section 3.3. Further evaluation is documented in Subsection 3.2.2.2.4.1.
3.2.1-10	Stainless steel heat exchanger tubes exposed to treated water	Reduction of heat transfer due to fouling	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. CR-3 manages reduction of heat transfer due to fouling with a combination of the Water Chemistry Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.2.2.2.4.2.
3.2.1-11	BWR Only				
3.2.1-12	Stainless steel high-pressure safety injection (charging) pump miniflow orifice exposed to treated borated water	Loss of material due to erosion	A plant-specific aging management program is to be evaluated for erosion of the orifice due to extended use of the centrifugal HPSI pump for normal charging.	Yes, plant specific	The plant-specific AMP used to manage the aging effect is the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program. Further evaluation is documented in Subsection 3.2.2.2.6.
3.2.1-13	BWR Only				

TABLE 3.2.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER V OF NUREG-1801 FOR ENGINEERED SAFETY FEATURES

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1-14	BWR Only				
3.2.1-15	Steel containment isolation piping, piping components, and piping elements internal surfaces exposed to treated water	Loss of material due to general, pitting, and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Containment isolation piping and component internal surfaces exposed to treated water are evaluated with their parent system. Further evaluation is documented in Subsection 3.2.2.2.8.2.
3.2.1-16	Steel piping, piping components, and piping elements exposed to lubricating oil	Loss of material due to general, pitting, and crevice corrosion	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	This item is applicable to components in the Make Up & Purification System. The Make Up & Purification System is evaluated in the Section 3.3. Further evaluation is documented in Subsection 3.2.2.2.8.3.
3.2.1-17	Steel (with or without coating or wrapping) piping, piping components, and piping elements buried in soil	Loss of material due to general, pitting, crevice, and microbiological-ly-influenced corrosion	Buried Piping and Tanks Surveillance or Buried Piping and Tanks Inspection	No Yes, detection of aging effects and operating experience are to be further evaluated	This item is not applicable as documented in Subsection 3.2.2.2.9.

TABLE 3.2.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER V OF NUREG-1801 FOR ENGINEERED SAFETY FEATURES

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1-18	BWR Only				
3.2.1-19	BWR Only				
3.2.1-20	BWR Only				
3.2.1-21	High-strength steel closure bolting exposed to air with steam or water leakage	Cracking due to cyclic loading, stress corrosion cracking	Bolting Integrity	No	This item is not applicable. The ESF Systems at CR-3 do not contain high-strength steel closure bolting.
3.2.1-22	Steel closure bolting exposed to air with steam or water leakage	Loss of material due to general corrosion	Bolting Integrity	No	The CR-3 AMR methodology includes the air with steam or water leakage environment within the Air - Indoor Uncontrolled environment. Therefore, components subject to that environment have been rolled up to 3.2.1-23.
3.2.1-23	Steel bolting and closure bolting exposed to air – outdoor (external), or air – indoor uncontrolled (external)	Loss of material due to general, pitting, and crevice corrosion	Bolting Integrity	No	Consistent with NUREG-1801. The aging effect is managed by the Bolting Integrity Program.
3.2.1-24	Steel closure bolting exposed to air – indoor uncontrolled (external)	Loss of preload due to thermal effects, gasket creep, and self-loosening	Bolting Integrity	No	Consistent with NUREG-1801. The aging effect is managed by the Bolting Integrity Program.

TABLE 3.2.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER V OF NUREG-1801 FOR ENGINEERED SAFETY FEATURES

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1-25	Stainless steel piping, piping components, and piping elements exposed to closed cycle cooling water >60°C (>140°F)	Cracking due to stress corrosion cracking	Closed-Cycle Cooling Water System	No	The aging effect is managed by the Closed-Cycle Cooling Water System Program.
3.2.1-26	Steel piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to general, pitting, and crevice corrosion	Closed-Cycle Cooling Water System	No	This item is not applicable to CR-3.
3.2.1-27	Steel heat exchanger components exposed to closed cycle cooling water	Loss of material due to general, pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System	No	The aging effect is managed by the Closed-Cycle Cooling Water System Program.
3.2.1-28	Stainless steel piping, piping components, piping elements, and heat exchanger components exposed to closed-cycle cooling water	Loss of material due to pitting and crevice corrosion	Closed-Cycle Cooling Water System	No	The aging effect is managed by the Closed-Cycle Cooling Water System Program.
3.2.1-29	Copper alloy piping, piping components, piping elements, and heat exchanger components exposed to closed cycle cooling water	Loss of material due to pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System	No	This item is not applicable to CR-3.
3.2.1-30	Stainless steel and copper alloy heat exchanger tubes exposed to closed cycle cooling water	Reduction of heat transfer due to fouling	Closed-Cycle Cooling Water System	No	The aging effect is managed by the Closed-Cycle Cooling Water System Program.

TABLE 3.2.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER V OF NUREG-1801 FOR ENGINEERED SAFETY FEATURES

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1-31	External surfaces of steel components including ducting, piping, ducting closure bolting, and containment isolation piping external surfaces exposed to air - indoor uncontrolled (external); condensation (external) and air - outdoor (external)	Loss of material due to general corrosion	External Surfaces Monitoring	No	Consistent with NUREG-1801. The aging effect is managed by the External Surfaces Monitoring Program.
3.2.1-32	Steel piping and ducting components and internal surfaces exposed to air – indoor uncontrolled (Internal)	Loss of material due to general corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	No	This item is not applicable to CR-3. CR-3 RB Spray piping is fabricated of stainless steel.
3.2.1-33	Steel encapsulation components exposed to air-indoor uncontrolled (internal)	Loss of material due to general, pitting, and crevice corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	No	This item is not applicable to ESF Systems. The valve chambers (steel encapsulation components) are treated as structural commodities (included with Penetration Sleeves) for the purposes of AMR. See Table 3.5.1, Item Number 3.5.1-18.
3.2.1-34	BWR Only.				Note: NUREG-1800 and NUREG-1801 incorrectly identify this Item Number as applicable to BWRs and PWRs. Only Unique Item V.D2-17 is associated with this row.

TABLE 3.2.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER V OF NUREG-1801 FOR ENGINEERED SAFETY FEATURES

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1-35	Steel containment isolation piping and components internal surfaces exposed to raw water	Loss of material due to general, pitting, crevice, and microbiological-ly-influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	This item is not applicable to CR-3 because there are no steel ESF containment isolation components exposed to raw water.
3.2.1-36	Steel heat exchanger components exposed to raw water	Loss of material due to general, pitting, crevice, galvanic, and microbiological-ly-influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	This item is not applicable to CR-3.
3.2.1-37	Stainless steel piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting, crevice, and microbiological-ly-influenced corrosion	Open-Cycle Cooling Water System	No	Consistent with NUREG-1801. The aging effect is managed by the Open-Cycle Cooling Water System.
3.2.1-38	Stainless steel containment isolation piping and components internal surfaces exposed to raw water	Loss of material due to pitting, crevice, and microbiological-ly-influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	This item is not applicable to CR-3 because there are no stainless steel ESF containment isolation components exposed to raw water

TABLE 3.2.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER V OF NUREG-1801 FOR ENGINEERED SAFETY FEATURES

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1-39	Stainless steel heat exchanger components exposed to raw water	Loss of material due to pitting, crevice, and microbiological-ly-influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	This item is not applicable to CR-3.
3.2.1-40	Steel and stainless steel heat exchanger tubes (serviced by open-cycle cooling water) exposed to raw water	Reduction of heat transfer due to fouling	Open-Cycle Cooling Water System	No	This item is not applicable to CR-3.
3.2.1-41	Copper alloy >15% Zn piping, piping components, piping elements, and heat exchanger components exposed to closed cycle cooling water	Loss of material due to selective leaching	Selective Leaching of Materials	No	This item is not applicable to CR-3.
3.2.1-42	Gray cast iron piping, piping components, piping elements exposed to closed-cycle cooling water	Loss of material due to selective leaching	Selective Leaching of Materials	No	This item is not applicable to CR-3.
3.2.1-43	Gray cast iron piping, piping components, and piping elements exposed to soil	Loss of material due to selective leaching	Selective Leaching of Materials	No	This item is not applicable to CR-3.

TABLE 3.2.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER V OF NUREG-1801 FOR ENGINEERED SAFETY FEATURES

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1-44	Gray cast iron motor cooler exposed to treated water	Loss of material due to selective leaching	Selective Leaching of Materials	No	This item is not applicable to CR-3.
3.2.1-45	Aluminum, copper alloy >15% Zn, and steel external surfaces, bolting, and piping, piping components, and piping elements exposed to air with borated water leakage	Loss of material due to Boric acid corrosion	Boric Acid Corrosion	No	Consistent with NUREG-1801. The aging effect is managed by the Boric Acid Corrosion Program.
3.2.1-46	Steel encapsulation components exposed to air with borated water leakage (internal)	Loss of material due to general, pitting, crevice and boric acid corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	No	This item is not applicable to ESF Systems. The valve chambers (steel encapsulation components) are treated as structural commodities (included with Penetration Sleeves) for the purposes of AMR. See Table 3.5.1, Item Numbers 3.5.1-18 and 3.5.1-55.
3.2.1-47	Cast austenitic stainless steel piping, piping components, and piping elements exposed to treated borated water >250°C (>482°F)	Loss of fracture toughness due to thermal aging embrittlement	Thermal Aging Embrittlement of CASS	No	This item is not applicable to CR-3. Cast austenitic stainless steel valves associated with ESF Systems are inside Class 1 boundaries and evaluated with RCS components. (See Table 3.1.1, Item 3.5.1-55.)
3.2.1-48	Stainless steel or stainless-steel-clad steel piping, piping components, piping elements, and tanks (including safety injection tanks/accumulators) exposed to treated borated water >60°C (>140°F)	Cracking due to stress corrosion cracking	Water Chemistry	No	Consistent with NUREG-1801. The aging effect is managed by the Water Chemistry Program.

TABLE 3.2.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER V OF NUREG-1801 FOR ENGINEERED SAFETY FEATURES

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1-49	Stainless steel piping, piping components, piping elements, and tanks exposed to treated borated water	Loss of material due to pitting and crevice corrosion	Water Chemistry	No	Consistent with NUREG-1801. The aging effect is managed by the Water Chemistry Program.
3.2.1-50	Aluminum piping, piping components, and piping elements exposed to air-indoor uncontrolled (internal/external)	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.2.1-51	Galvanized steel ducting exposed to air – indoor controlled (external)	None	None	NA - No AEM or AMP	This item is not applicable to CR-3.
3.2.1-52	Glass piping elements exposed to air – indoor uncontrolled (external), lubricating oil, raw water, treated water, or treated borated water	None	None	NA - No AEM or AMP	This item is not applicable to CR-3.
3.2.1-53	Stainless steel, copper alloy, and nickel alloy piping, piping components, and piping elements exposed to air – indoor uncontrolled (external)	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.2.1-54	Steel piping, piping components, and piping elements exposed to air – indoor controlled (external)	None	None	NA - No AEM or AMP	This item is not applicable to CR-3.
3.2.1-55	Steel and stainless steel piping, piping components, and piping elements in concrete	None	None	NA - No AEM or AMP	This item is not applicable to CR-3.

TABLE 3.2.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER V OF NUREG-1801 FOR ENGINEERED SAFETY FEATURES

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1-56	Steel, stainless steel, and copper alloy piping, piping components, and piping elements exposed to gas	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.2.1-57	Stainless steel and copper alloy <15% Zn piping, piping components, and piping elements exposed to air with borated water leakage	None	None	NA - No AEM or AMP	This item is not applicable to CR-3.

TABLE 3.2.2-1 ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING SPRAY SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	V.E-5 (EP-24)	3.2.1-24	A
				Loss of Material due to General Corrosion	Bolting Integrity	V.E-4 (EP-25)	3.2.1-23	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	V.E-2 (E-41)	3.2.1-45	A
			Air - Outdoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	V.E-1 (EP-1)	3.2.1-23	A
Containment Isolation Piping and Components	M-1	Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	V.F-12 (EP-18)	3.2.1-53	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.A-27 (EP-41)	3.2.1-49	A
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-12 (EP-18)	3.2.1-53	A

TABLE 3.2.2-1 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING SPRAY SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting elements	M-1	Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	V.F-12 (EP-18)	3.2.1-53	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.A-27 (EP-41)	3.2.1-49	A
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-12 (EP-18)	3.2.1-53	A
	M-3	Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	V.F-12 (EP-18)	3.2.1-53	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.A-27 (EP-41)	3.2.1-49	A
Piping, piping components, piping elements, and tanks	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A
		Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	C
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-3 (EP-10)	3.2.1-53	A, 202
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	V.E-11 (EP-38)	3.2.1-45	A

TABLE 3.2.2-1 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING SPRAY SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	V.F-12 (EP-18)	3.2.1-53	A
			Dry Gas (Inside)	None	None	V.F-15 (EP-22)	3.2.1-56	A
			Raw Water (Inside)	Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 201
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	V.A-26 (EP-53)	3.2.1-08	E, 201
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.A-27 (EP-41)	3.2.1-49	A
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-12 (EP-18)	3.2.1-53	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J

TABLE 3.2.2-1 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING SPRAY SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Building Spray Nozzles	M-8	Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	V.F-12 (EP-18)	3.2.1-53	A
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Reactor Building Spray Pumps	M-1	Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	V.A-23 (EP-33)	3.2.1-28	B, 203
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.A-27 (EP-41)	3.2.1-49	A
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-12 (EP-18)	3.2.1-53	A

TABLE 3.2.2-1 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING SPRAY SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Building Spray Pumps Seal Water Cyclone Separator	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.A-27 (EP-41)	3.2.1-49	A
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-12 (EP-18)	3.2.1-53	A
	M-2	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.A-27 (EP-41)	3.2.1-49	A
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-12 (EP-18)	3.2.1-53	A

TABLE 3.2.2-2 ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – CORE FLOOD SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	V.E-5 (EP-24)	3.2.1-24	A
				Loss of Material due to General Corrosion	Bolting Integrity	V.E-4 (EP-25)	3.2.1-23	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	V.E-2 (E-41)	3.2.1-45	A
Containment Isolation Piping and Components	M-1	Stainless Steel	Dry Gas (Inside)	None	None	V.F-15 (EP-22)	3.2.1-56	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Core Flood Tanks	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
		Nickel Base Alloys	Treated Water (Inside)	Cracking due to SCC	Nickel-Alloy Commitment			J, 205
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry			J
		Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-33 (E-38)	3.2.1-48	A

TABLE 3.2.2-2 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – CORE FLOOD SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Core Flood Tanks (continued)	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A
Piping Insulation	M-6	Insulation	Air - Indoor Uncontrolled (Outside)	None	None			J
Piping, piping components, and piping elements	M-1	Cast Austenitic Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-10 (R-18)	3.1.1-07	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Loss of Fracture Toughness due to Thermal Embrittlement	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.C2-6 (R-08)	3.1.1-55	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-5 (R-09)	3.1.1-68	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.2.2-2 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – CORE FLOOD SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	C
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-3 (EP-10)	3.2.1-53	A, 202
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	V.E-11 (EP-38)	3.2.1-45	A
		Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	V.F-12 (EP-18)	3.2.1-53	A
			Dry Gas (Inside)	None	None	V.F-15 (EP-22)	3.2.1-56	A
			Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-31 (E-12)	3.2.1-48	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	V.D1-27 (E-13)	3.2.1-01	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-12 (EP-18)	3.2.1-53	A

TABLE 3.2.2-3 ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – DECAY HEAT REMOVAL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Borated Water Storage Tank	M-1	Stainless Steel	Air - Outdoor (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	V.D1-29 (EP-53)	3.2.1-08	E
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J, 204
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	V.E-5 (EP-24)	3.2.1-24	A
				Loss of Material due to General Corrosion	Bolting Integrity	V.E-4 (EP-25)	3.2.1-23	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	V.E-2 (E-41)	3.2.1-45	A
			Air - Outdoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	V.E-1 (EP-1)	3.2.1-23	A

TABLE 3.2.2-3 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – DECAY HEAT REMOVAL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment Isolation Piping and Components	M-1	Cast Austenitic Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-10 (R-18)	3.1.1-07	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Loss of Fracture Toughness due to Thermal Embrittlement	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.C2-6 (R-08)	3.1.1-55	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-5 (R-09)	3.1.1-68	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
		Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-31 (E-12)	3.2.1-48	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	V.D1-27 (E-13)	3.2.1-01	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-12 (EP-18)	3.2.1-53	A

TABLE 3.2.2-3 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – DECAY HEAT REMOVAL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Decay Heat Removal Heat Exchanger Components	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	V.D1-6 (E-17)	3.2.1-27	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
		Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-31 (E-12)	3.2.1-48	C
				Cumulative Fatigue Damage due to Fatigue	TLAA	V.D1-27 (E-13)	3.2.1-01	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	C
			Closed Cycle Cooling Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	V.D1-4 (E-19)	3.2.1-28	B
				Cracking due to SCC	Closed-Cycle Cooling Water System	V.D1-23 (EP-44)	3.2.1-25	D

TABLE 3.2.2-3 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – DECAY HEAT REMOVAL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Decay Heat Removal Heat Exchanger Tubes	M-5	Stainless Steel	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Water Chemistry and One-Time Inspection	V.A-16 (EP-34)	3.2.1-10	C
			Closed Cycle Cooling Water (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	V.D1-9 (EP-35)	3.2.1-30	B
Decay Heat Pump Seal Water Cyclone Separator	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-12 (EP-18)	3.2.1-53	A
	M-2	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-12 (EP-18)	3.2.1-53	A

TABLE 3.2.2-3 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – DECAY HEAT REMOVAL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Decay Heat Pumps	M-1	Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	V.D1-22 (EP-33)	3.2.1-28	B, 203
			Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-31 (E-12)	3.2.1-48	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	V.D1-27 (E-13)	3.2.1-01	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Flow restricting elements	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-31 (E-12)	3.2.1-48	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	V.D1-27 (E-13)	3.2.1-01	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-12 (EP-18)	3.2.1-53	A

TABLE 3.2.2-3 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – DECAY HEAT REMOVAL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting elements (continued)	M-3	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-31 (E-12)	3.2.1-48	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	V.D1-27 (E-13)	3.2.1-01	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A
Orifice (miniflow recirculation)	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-31 (E-12)	3.2.1-48	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-12 (EP-18)	3.2.1-53	A
	M-3	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-31 (E-12)	3.2.1-48	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A
Piping Insulation	M-6	Insulation	Air - Indoor Uncontrolled (Outside)	None	None			J

TABLE 3.2.2-3 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – DECAY HEAT REMOVAL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Cast Austenitic Stainless Steel	Reactor Coolant (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	IV.C2-10 (R-18)	3.1.1-07	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Loss of Fracture Toughness due to Thermal Embrittlement	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.C2-6 (R-08)	3.1.1-55	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-5 (R-09)	3.1.1-68	A
			Air - Indoor Uncontrolled (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
		Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-31 (E-12)	3.2.1-48	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	V.D1-27 (E-13)	3.2.1-01	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A

TABLE 3.2.2-3 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – DECAY HEAT REMOVAL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Air - Indoor Uncontrolled (Outside)	None	None	V.F-12 (EP-18)	3.2.1-53	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J

Notes for Tables 3.2.2-1 through 3.2.2-3:

Generic Notes:

A. Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B. Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C. Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D. Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E. Consistent with NUREG-1801 item for material, environment, and aging effect, but a different AMP is credited or NUREG-1801 identifies a plant-specific AMP.
F. Material not in NUREG-1801 for this component.
G. Environment not in NUREG-1801 for this component and material.
H. Aging effect not in NUREG-1801 for this component, material and environment combination.
I. Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J. Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant-specific Notes:

201. A raw water environment has been assumed for abandoned equipment associated with Sodium Hydroxide tanks.
202. The components are located in areas that do not contain borated water systems.
203. The RB Spray and Decay Heat Pumps have jacketed bearing housings and stuffing box heads; these jackets are supplied with cooling from the DC System.
204. Aging effects are associated with the exposed dome of the BWST. The wall of the tank is sealed within a protective concrete cylinder, while the floor is in contact with a grouted base.
205. This item addresses nickel alloy nozzles and welds associated with the Core Flood Tanks.

3.3 AGING MANAGEMENT OF AUXILIARY SYSTEMS

3.3.1 INTRODUCTION

Section 3.3 provides the results of the aging management reviews (AMRs) for those mechanical components identified in Subsection 2.3.3, Auxiliary Systems. The systems or portions of systems are described in the indicated subsections.

1. Air Handling Ventilation and Cooling System (Subsection 2.3.3.1)
2. Reactor Building Recirculation System (Subsection 2.3.3.2)
3. Reactor Building Miscellaneous Ventilation System (Subsection 2.3.3.3)
4. Reactor Building Purge System (Subsection 2.3.3.4)
5. Auxiliary Building Supply System (Subsection 2.3.3.5)
6. Fuel Handling Area Supply System (Subsection 2.3.3.6)
7. Decay Heat Closed Cycle Pump Cooling System (Subsection 2.3.3.7)
8. Spent Fuel Coolant Pump Cooling System (Subsection 2.3.3.8)
9. Spent Fuel Pit Supply System (Subsection 2.3.3.9)
10. Auxiliary Building Exhaust System (Subsection 2.3.3.10)
11. Control Complex Ventilation System (Subsection 2.3.3.11)
12. Emergency Diesel Generator Air Handling System (Subsection 2.3.3.12)
13. Miscellaneous Area HVAC System (Subsection 2.3.3.13)
14. Turbine Building Ventilation System (Subsection 2.3.3.14)
15. Penetration Cooling System (Subsection 2.3.3.15)
16. Emergency Feedwater Initiation and Control Room HVAC System (Subsection 2.3.3.16)
17. Appendix R Control Complex Dedicated Cooling Supply System (Subsection 2.3.3.17)
18. Emergency Feedwater Pump Building Ventilation System (Subsection 2.3.3.18)

19. Chemical Addition System (Subsection 2.3.3.19)

20. Liquid Sampling System (Subsection 2.3.3.20)

21. Post Accident Liquid Sampling System (Subsection 2.3.3.21)

22. Control Complex Chilled Water System (Subsection 2.3.3.22)

23. Appendix R Chilled Water System (Subsection 2.3.3.23)

24. Industrial Cooling System (Subsection 2.3.3.24)

25. Circulating Water System (Subsection 2.3.3.25)

26. EFP-3 Diesel Air Starting System (Subsection 2.3.3.26)

27. Decay Heat Closed Cycle Cooling System (Subsection 2.3.3.27)

28. Fuel Oil System (Subsection 2.3.3.28)

29. Jacket Coolant System (Subsection 2.3.3.29)

30. Diesel Generator Lube Oil System (Subsection 2.3.3.30)

31. Domestic Water System (Subsection 2.3.3.31)

32. Demineralized Water System (Subsection 2.3.3.32)

33. Emergency Diesel Generator System (Subsection 2.3.3.33)

34. Floor Drains System (Subsection 2.3.3.34)

35. Fuel Handling System (Subsection 2.3.3.35)

36. Fire Protection System (Subsection 2.3.3.36)

37. Hydrogen Supply System (Subsection 2.3.3.37)

38. Instrument Air System (Subsection 2.3.3.38)

39. Reactor Coolant Pump Lube Oil Collection System (Subsection 2.3.3.39)

40. Leak Rate Test System (Subsection 2.3.3.40)

41. Miscellaneous Drains System (Subsection 2.3.3.41)
42. Make Up & Purification System (Subsection 2.3.3.42)
43. Miscellaneous Mechanical & Structures System (Subsection 2.3.3.43)
44. Nitrogen Supply System (Subsection 2.3.3.44)
45. Penetration Cooling Auxiliary System (Subsection 2.3.3.45)
46. Reactor Building Airlock System (Subsection 2.3.3.46)
47. Roof Drains System (Subsection 2.3.3.47)
48. Radiation Monitoring System (Subsection 2.3.3.48)
49. Nuclear Service and Decay Heat Sea Water System (Subsection 2.3.3.49)
50. Station Air System (Subsection 2.3.3.50)
51. Secondary Services Closed Cycle Cooling Water System (Subsection 2.3.3.51)
52. Station Drains System (Subsection 2.3.3.52)
53. Spent Fuel Cooling System (Subsection 2.3.3.53)
54. Nuclear Services Closed Cycle Cooling System (Subsection 2.3.3.54)
55. Waste Disposal System (Subsection 2.3.3.55)
56. Radioactive Gas Waste Disposal System (Subsection 2.3.3.56)
57. Radioactive Liquid Waste Disposal System (Subsection 2.3.3.57)
58. Reactor Coolant and Miscellaneous Waste Evaporator System (Subsection 2.3.3.58)
59. Waste Gas Sampling System (Subsection 2.3.3.59)
60. Waste Sampling System (Subsection 2.3.3.60)
61. Post Accident Containment Atmospheric Sampling (Subsection 2.3.3.61)

Table 3.3.1, Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems, provides the summary of the programs evaluated in NUREG-1801 that are applicable to component/commodity groups in this Section. Table 3.3.1 uses the format of Table 1 described in Section 3.0 above.

3.3.1.1 Operating Experience

The AMR methodology applied at CR-3 included use of operating experience (OE) to confirm the set of aging effects that had been predicted through material/environment evaluations. Plant-specific and industry OE was identified and reviewed in conjunction with the aging management review. In general, the OE review consisted of the following:

Site: In general, site-specific OE has been captured by a review of one or more of the following as appropriate: (1) the Action Tracking database, (2) System Engineering Notebooks and System Health Reports, and (3) discussions with Site engineering personnel. This effort also may have included a review of work management and leak log records, applicable correspondence (Licensee Event Reports, etc.), and Nuclear Assessment Section assessment records. As a result of the review, the following additional unique plant-specific OE was identified:

- Cracking due to stress corrosion cracking has been identified for the Spent Fuel Cooling System,
- Loss of material and fouling by corrosion products for Emergency Diesel Generator air start components,
- Biofouling of components in the Circulating Water System and Nuclear Services and Decay Heat Sea Water System,
- Silting and fouling of small bore lines in the Domestic Water System,
- Crevice and pitting corrosion and boric acid corrosion of copper alloy Decay Heat Closed Cycle Cooling System components in the Decay Heat Pit, and
- Loss of material, fouling, cracking, and leakage of Floor Drains, Miscellaneous Drains, Roof Drains, and Station Drains Systems.

Industry: Industry OE has been captured in NUREG-1801, “Generic Aging Lessons Learned (GALL),” and is the primary method for verifying that a complete set of potential aging effects is identified. An evaluation of industry OE published since the effective date of NUREG-1801 was performed to identify any additional aging effects requiring management. This was performed using the Progress Energy internal OE review process which directs the review of OE and requires that it be screened and evaluated for site applicability. OE sources subject to review include INPO and WANO items, NRC documents (Information Notices, Generic Letters, Notices of Violation, and staff reports), 10 CFR 21 reports, and vendor bulletins, as well as, corporate internal OE information from Progress Energy nuclear sites. The industry OE review identified no additional unpredicted aging effects requiring management.

On-Going On-going review of plant-specific and industry operating experience is continuing to be performed in accordance with the Corrective Action Program and the Progress Energy internal OE review process.

3.3.2 RESULTS

The following tables summarize the results of the aging management review for systems in the Auxiliary Systems area.

Table 3.3.2-1 Auxiliary Systems – Summary of Aging Management Evaluation – Air Handling Ventilation and Cooling System

Table 3.3.2-2 Auxiliary Systems – Summary of Aging Management Evaluation – Reactor Building Recirculation System

Table 3.3.2-3 Auxiliary Systems – Summary of Aging Management Evaluation – Reactor Building Miscellaneous Ventilation System

Table 3.3.2-4 Auxiliary Systems – Summary of Aging Management Evaluation – Reactor Building Purge System

Table 3.3.2-5 Auxiliary Systems – Summary of Aging Management Evaluation – Auxiliary Building Supply System

Table 3.3.2-6 Auxiliary Systems – Summary of Aging Management Evaluation – Fuel Handling Area Supply System

Table 3.3.2-7 Auxiliary Systems – Summary of Aging Management Evaluation – Decay Heat Closed Cycle Pump Cooling System

Table 3.3.2-8 Auxiliary Systems – Summary of Aging Management Evaluation – Spent Fuel Coolant Pump Cooling System

Table 3.3.2-9 Auxiliary Systems – Summary of Aging Management Evaluation – Spent Fuel Pit Supply System

Table 3.3.2-55 Auxiliary Systems – Summary of Aging Management Evaluation – Waste Disposal System

Table 3.3.2-56 Auxiliary Systems – Summary of Aging Management Evaluation – Radioactive Gas Waste Disposal System

Table 3.3.2-57 Auxiliary Systems – Summary of Aging Management Evaluation – Radioactive Liquid Waste Disposal System

Table 3.3.2-58 Auxiliary Systems – Summary of Aging Management Evaluation – Reactor Coolant and Miscellaneous Waste Evaporator System

Table 3.3.2-59 Auxiliary Systems – Summary of Aging Management Evaluation – Waste Gas Sampling System

Table 3.3.2-60 Auxiliary Systems – Summary of Aging Management Evaluation – Waste Sampling System

Table 3.3.2-61 Auxiliary Systems – Summary of Aging Management Evaluation – Post Accident Containment Atmospheric Sampling

These tables use the format of Table 2 described in Section 3.0 above.

3.3.2.1 Materials, Environment, Aging Effects Requiring Management and Aging Management Programs

The materials from which specific components/commodities are fabricated, the environments to which they are exposed, the aging effects requiring management, and the aging management programs used to manage these aging effects are provided for each of the above systems in the following subsections.

3.3.2.1.1 Air Handling Ventilation and Cooling System

Materials

The materials of construction for the Air Handling Ventilation and Cooling System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Galvanized Steel
- Stainless Steel

Environment

The Air Handling Ventilation and Cooling System components are exposed to the following:

- Air - Indoor Uncontrolled
- Diesel Exhaust
- Dried Air
- Raw Water

Aging Effects Requiring Management

The following Air Handling Ventilation and Cooling System aging effects require management:

- Cracking
- Cumulative Fatigue Damage
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Air Handling Ventilation and Cooling System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Selective Leaching of Materials Program

3.3.2.1.2 Reactor Building (RB) Recirculation System

Materials

The materials of construction for the RB Recirculation System components are:

- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The RB Recirculation System components are exposed to the following:

- Air - Indoor Uncontrolled
- Closed-Cycle Cooling Water
- Raw Water

Aging Effects Requiring Management

The following RB Recirculation System aging effects require management:

- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the RB Recirculation System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Selective Leaching of Materials Program

3.3.2.1.3 RB Miscellaneous Ventilation System

Materials

The materials of construction for the RB Miscellaneous Ventilation System components are:

- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The RB Miscellaneous Ventilation System components are exposed to the following:

- Air - Indoor Uncontrolled

- Raw Water

Aging Effects Requiring Management

The following RB Miscellaneous Ventilation System aging effects require management:
- Hardening and Loss of Strength
- Loss of Material

Aging Management Programs

The following AMPs manage the aging effects for the RB Miscellaneous Ventilation System components:
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.4 RB Purge System

Materials

The materials of construction for the RB Purge System components are:
- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The RB Purge System components are exposed to the following:
- Air - Indoor Uncontrolled
- Dried Air

Aging Effects Requiring Management

The following RB Purge System aging effects require management:
- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the RB Purge System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.5 Auxiliary Building (AB) Supply System

Materials

The materials of construction for the AB Supply System components are:

- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The AB Supply System components are exposed to the following:

- Air - Indoor Uncontrolled
- Dried Air

Aging Effects Requiring Management

The following AB Supply System aging effects require management:

- Hardening and Loss of Strength
- Loss of Material

Aging Management Programs

The following AMPs manage the aging effects for the AB Supply System components:

- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.6 Fuel Handling Area Supply System

Materials

The materials of construction for the Fuel Handling Area Supply System components are:

- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The Fuel Handling Area Supply System components are exposed to the following:

- Air - Indoor Uncontrolled
- Dried Air

Aging Effects Requiring Management

The following Fuel Handling Area Supply System aging effects require management:

- Hardening and Loss of Strength
- Loss of Material

Aging Management Programs

The following AMPs manage the aging effects for the Fuel Handling Area Supply System components:

- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.7 Decay Heat (DH) Closed Cycle Pump Cooling System

Materials

The materials of construction for the DH Closed Cycle Pump Cooling System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel

- Copper and Copper Alloys
- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The DH Closed Cycle Pump Cooling System components are exposed to the following:

- Air - Indoor Uncontrolled
- Closed-Cycle Cooling Water
- Dried Air
- Raw Water

Aging Effects Requiring Management

The following DH Closed Cycle Pump Cooling System aging effects require management:

- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the DH Closed Cycle Pump Cooling System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Selective Leaching of Materials Program

3.3.2.1.8 Spent Fuel Coolant Pump Cooling System

Materials

The materials of construction for the Spent Fuel Coolant Pump Cooling System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel

- Copper and Copper Alloys
- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The Spent Fuel Coolant Pump Cooling System components are exposed to the following:
- Air - Indoor Uncontrolled
- Closed-Cycle Cooling Water
- Dried Air
- Raw Water

Aging Effects Requiring Management

The following Spent Fuel Coolant Pump Cooling System aging effects require management:
- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Spent Fuel Coolant Pump Cooling System components:
- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Selective Leaching of Materials Program

3.3.2.1.9 Spent Fuel Pit Supply System

Materials

The materials of construction for the Spent Fuel Pit Supply System components are:
- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel
- Copper and Copper Alloys

- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The Spent Fuel Pit Supply System components are exposed to the following:

- Air - Indoor Uncontrolled
- Dried Air

Aging Effects Requiring Management

The following Spent Fuel Pit Supply System aging effects require management:

- Hardening and Loss of Strength
- Loss of Material

Aging Management Programs

The following AMPs manage the aging effects for the Spent Fuel Pit Supply System components:

- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.10 AB Exhaust System

Materials

The materials of construction for the AB Exhaust System components are:

- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The AB Exhaust System components are exposed to the following:

- Air - Indoor Uncontrolled
- Dried Air

Aging Effects Requiring Management

The following AB Exhaust System aging effects require management:

- Hardening and Loss of Strength
- Loss of Material

Aging Management Programs

The following AMPs manage the aging effects for the AB Exhaust System components:

- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.11 Control Complex Ventilation System

Materials

The materials of construction for the Control Complex Ventilation System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Elastomers
- Galvanized Steel
- Glass
- PVC or Thermoplastics
- Stainless Steel

Environment

The Control Complex Ventilation System components are exposed to the following:

- Air - Indoor Uncontrolled
- Closed-Cycle Cooling Water
- Dried Air
- Dry Gas
- Raw Water

Aging Effects Requiring Management

The following Control Complex Ventilation System aging effects require management:

- Hardening and Loss of Strength

- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Control Complex Ventilation System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Selective Leaching of Materials Program

3.3.2.1.12 Emergency Diesel Generator (EDG) Air Handling System

Materials

The materials of construction for the EDG Air Handling System components are:

- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The EDG Air Handling System components are exposed to the following:

- Air - Indoor Uncontrolled
- Dried Air

Aging Effects Requiring Management

The following EDG Air Handling System aging effects require management:

- Hardening and Loss of Strength
- Loss of Material

Aging Management Programs

The following AMPs manage the aging effects for the EDG Air Handling System components:

- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.13 Miscellaneous Area HVAC System

Materials

The materials of construction for the Miscellaneous Area HVAC System components are:

- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The Miscellaneous Area HVAC System components are exposed to the following:

- Air - Indoor Uncontrolled
- Dried Air

Aging Effects Requiring Management

The following Miscellaneous Area HVAC System aging effects require management:

- Hardening and Loss of Strength
- Loss of Material

Aging Management Programs

The following AMPs manage the aging effects for the Miscellaneous Area HVAC System components:

- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.14 Turbine Building (TB) Ventilation System

Materials

The materials of construction for the TB Ventilation System components are:

- Galvanized Steel

Environment

The TB Ventilation System components are exposed to the following:

- Air - Indoor Uncontrolled

Aging Effects Requiring Management

The following TB Ventilation System aging effects require management:

- Loss of Material

Aging Management Programs

The following AMPs manage the aging effects for the TB Ventilation System components:

- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.15 Penetration Cooling System

Materials

The materials of construction for the Penetration Cooling System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Galvanized Steel
- Gray Cast Iron
- Stainless Steel

Environment

The Penetration Cooling System components are exposed to the following:

- Air - Indoor Uncontrolled
- Closed-Cycle Cooling Water

- Dried Air
- Raw Water

Aging Effects Requiring Management

The following Penetration Cooling System aging effects require management:

- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Penetration Cooling System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Selective Leaching of Materials Program

3.3.2.1.16 Emergency Feedwater Initiation and Control (EFIC) Room HVAC System

Materials

The materials of construction for the EFIC Control Room HVAC System components are:

- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The EFIC Room HVAC System components are exposed to the following:

- Air - Indoor Uncontrolled
- Closed-Cycle Cooling Water
- Raw Water

Aging Effects Requiring Management

The following EFIC Room HVAC System aging effects require management:

- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the EFIC Room HVAC System components:

- Bolting Integrity Program
- Closed-Cycle Cooling Water System
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Selective Leaching of Materials Program

3.3.2.1.17 Appendix R Control Complex (CC) Dedicated Cooling Supply System

Materials

The materials of construction for the Appendix R CC Dedicated Cooling Supply System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Copper and Copper Alloys
- Galvanized Steel

Environment

The Appendix R CC Dedicated Cooling Supply System components are exposed to the following:

- Air - Indoor Uncontrolled
- Closed-Cycle Cooling Water

Aging Effects Requiring Management

The following Appendix R CC Dedicated Cooling Supply System aging effects require management:

- Loss of Material
- Loss of Preload

- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Appendix R CC Dedicated Cooling Supply System components:

- Bolting Integrity Program
- Closed-Cycle Cooling Water System
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Selective Leaching of Materials Program

3.3.2.1.18 Emergency Feedwater Pump Building (EFPB) Ventilation System

Materials

The materials of construction for the EFPB Ventilation System components are:

- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The EFPB Ventilation System components are exposed to the following:

- Air - Indoor Uncontrolled
- Air - Outdoor
- Diesel Exhaust
- Dry Gas
- Raw Water

Aging Effects Requiring Management

The following EFPB Ventilation System aging effects require management:

- Cracking
- Cumulative Fatigue Damage
- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the EFPB Ventilation System components:

- Bolting Integrity Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.19 Chemical Addition (CA) System

Materials

The materials of construction for the CA System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Copper and Copper Alloys
- Glass
- Stainless Steel

Environment

The CA System components are exposed to the following:

- Air - Indoor Uncontrolled
- Dried Air
- Treated Water

Aging Effects Requiring Management

The following CA System aging effects require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the CA System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Water Chemistry Program

3.3.2.1.20 Liquid Sampling System

Materials

The materials of construction for the Liquid Sampling System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Fiber Glass or Fiber Reinforced Plastic
- Glass
- Insulation
- Stainless Steel

Environment

The Liquid Sampling System components are exposed to the following:

- Air - Indoor Uncontrolled
- Closed-Cycle Cooling Water
- Dried Air
- Dry Gas
- Raw Water
- Treated Water

Aging Effects Requiring Management

The following Liquid Sampling System aging effects require management:

- Cracking
- Cumulative Fatigue Damage
- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Liquid Sampling System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- One-Time Inspection Program

- Water Chemistry Program

3.3.2.1.21 Post Accident Liquid Sampling System

Materials

The materials of construction for the Post Accident Liquid Sampling System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Glass
- Nickel Base Alloys
- PVC or Thermoplastics
- Stainless Steel

Environment

The Post Accident Liquid Sampling System components are exposed to the following:

- Air - Indoor Uncontrolled
- Closed-Cycle Cooling Water
- Dried Air
- Dry Gas
- Raw Water
- Treated Water

Aging Effects Requiring Management

The following Post Accident Liquid Sampling System aging effects require management:

- Cracking
- Cumulative Fatigue Damage
- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Post Accident Liquid Sampling System components:

- Bolting Integrity Program

- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Water Chemistry Program

3.3.2.1.22 Control Complex Chilled Water System

Materials

The materials of construction for the Control Complex Chilled Water System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Elastomers
- Glass
- Gray Cast Iron
- Insulation
- PVC or Thermoplastics
- Stainless Steel

Environment

The Control Complex Chilled Water System components are exposed to the following:

- Air - Indoor Uncontrolled
- Closed-Cycle Cooling Water
- Dried Air
- Dry Gas
- Lubricating Oil
- Treated Water

Aging Effects Requiring Management

The following Control Complex Chilled Water System aging effects require management:

- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Control Complex Chilled Water System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Lubricating Oil Analysis Program
- One-Time Inspection Program
- Selective Leaching of Materials Program
- Water Chemistry Program

3.3.2.1.23 Appendix R Chilled Water System

Materials

The materials of construction for the Appendix R Chilled Water System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Elastomers
- Galvanized Steel
- Glass
- Insulation
- Stainless Steel

Environment

The Appendix R Chilled Water System components are exposed to the following:

- Air - Indoor Uncontrolled
- Air - Outdoor
- Closed-Cycle Cooling Water
- Dry Gas

Aging Effects Requiring Management

The following Appendix R Chilled Water System aging effects require management:

- Cracking

- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Appendix R Chilled Water System components:

- Bolting Integrity Program
- Closed-Cycle Cooling Water System Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Selective Leaching of Materials Program

3.3.2.1.24 Industrial Cooling System

Materials

The materials of construction for the Industrial Cooling System components are:

- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Elastomers
- Glass
- Gray Cast Iron
- Insulation
- Stainless Steel

Environment

The Industrial Cooling System components are exposed to the following:

- Air - Indoor Uncontrolled
- Closed-Cycle Cooling Water
- Dried Air
- Raw Water

Aging Effects Requiring Management

The following Industrial Cooling System aging effects require management:

- Hardening and Loss of Strength
- Loss of Material

- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Industrial Cooling System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Selective Leaching of Materials Program

3.3.2.1.25 Circulating Water System

Materials

The materials of construction for the Circulating Water System components are:

- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Elastomers
- Glass
- Reinforced Concrete
- Stainless Steel

Environment

The Circulating Water System components are exposed to the following:

- Air - Indoor Uncontrolled
- Air - Outdoor
- Dried Air
- Raw Water
- Soil

Aging Effects Requiring Management

The following Circulating Water System aging effects require management:

- Change in Material Properties
- Cracking
- Hardening and Loss of Strength
- Loss of Material

- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Circulating Water System components:

- Bolting Integrity Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Selective Leaching of Materials Program
- Structures Monitoring Program

3.3.2.1.26 EFP-3 Diesel Air Starting System

Materials

The materials of construction for the EFP-3 Diesel Air Starting System components are:

- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Stainless Steel

Environment

The EFP-3 Diesel Air Starting System components are exposed to the following:

- Air - Indoor Uncontrolled

Aging Effects Requiring Management

The following EFP-3 Diesel Air Starting System aging effects require management:

- Flow Blockage
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the EFP-3 Diesel Air Starting System components:

- Bolting Integrity Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

- Selective Leaching of Materials Program

3.3.2.1.27 Decay Heat Closed Cycle Cooling System

Materials

The materials of construction for the Decay Heat Closed Cycle Cooling System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Glass
- Gray Cast Iron
- Insulation
- Stainless Steel

Environment

The Decay Heat Closed Cycle Cooling System components are exposed to the following:

- Air - Indoor Uncontrolled
- Closed-Cycle Cooling Water
- Dried Air
- Dry Gas
- Lubricating Oil
- Open-Cycle Cooling Water
- Raw Water

Aging Effects Requiring Management

The following Decay Heat Closed Cycle Cooling System aging effects require management:

- Flow Blockage
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Decay Heat Closed Cycle Cooling System components:

- Bolting Integrity Program

- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Lubricating Oil Analysis Program
- One-Time Inspection Program
- Open-Cycle Cooling Water System Program
- Selective Leaching of Materials Program

3.3.2.1.28 Fuel Oil System

Materials

The materials of construction for the Fuel Oil System components are:
- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Glass
- Gray Cast Iron
- Stainless Steel

Environment

The Fuel Oil System components are exposed to the following:
- Air - Indoor Uncontrolled
- Air - Outdoor
- Fuel Oil
- Raw Water
- Soil

Aging Effects Requiring Management

The following Fuel Oil System aging effects require management:
- Cracking
- Flow Blockage
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Fuel Oil System components:

- Bolting Integrity Program
- Buried Piping and Tanks Inspection Program
- External Surfaces Monitoring Program
- Fuel Oil Chemistry Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- One-Time Inspection Program
- Selective Leaching of Materials Program

3.3.2.1.29 Jacket Coolant System

Materials

The materials of construction for the Jacket Coolant System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Elastomers
- Galvanized Steel
- Glass
- Gray Cast Iron
- Stainless Steel

Environment

The Jacket Coolant System components are exposed to the following:

- Air - Indoor Uncontrolled
- Closed-Cycle Cooling Water
- Lubricating Oil

Aging Effects Requiring Management

The following Jacket Coolant System aging effects require management:

- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Jacket Coolant System components:

- Bolting Integrity Program
- Closed-Cycle Cooling Water System
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Lubricating Oil Analysis Program
- One-Time Inspection Program
- Selective Leaching of Materials Program

3.3.2.1.30 Diesel Generator Lube Oil System

Materials

The materials of construction for the Diesel Generator Lube Oil System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Gray Cast Iron
- Glass
- Stainless Steel

Environment

The Diesel Generator Lube Oil System components are exposed to the following:

- Air - Indoor Uncontrolled
- Closed-Cycle Cooling Water
- Lubricating Oil

Aging Effects Requiring Management

The following Diesel Generator Lube Oil System aging effects require management:

- Cracking
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Diesel Generator Lube Oil System components:

- Bolting Integrity Program
- Closed-Cycle Cooling Water System Program
- External Surfaces Monitoring Program
- Lubricating Oil Analysis Program
- One-Time Inspection Program
- Selective Leaching of Materials Program

3.3.2.1.31 Domestic Water System

Materials

The materials of construction for the Domestic Water System components are:

- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Glass
- Stainless Steel

Environment

The Domestic Water System components are exposed to the following:

- Air - Indoor Uncontrolled
- Air - Outdoor
- Raw Water

Aging Effects Requiring Management

The following Domestic Water System aging effects require management:

- Flow Blockage
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Domestic Water System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program

- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Selective Leaching of Materials Program

3.3.2.1.32 Demineralized Water System

Materials

The materials of construction for the Demineralized Water System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Glass
- Stainless Steel

Environment

The Demineralized Water System components are exposed to the following:

- Air - Indoor Uncontrolled
- Dried Air
- Treated Water

Aging Effects Requiring Management

The following Demineralized Water System aging effects require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Demineralized Water System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- One-Time Inspection Program
- Water Chemistry Program

3.3.2.1.33 Emergency Diesel Generator System

Materials

The materials of construction for the Emergency Diesel Generator System components are:

- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Insulation
- Stainless Steel

Environment

The Emergency Diesel Generator System components are exposed to the following:

- Air - Indoor Uncontrolled
- Air - Outdoor
- Diesel Exhaust

Aging Effects Requiring Management

The following Emergency Diesel Generator System aging effects require management:

- Cracking
- Cumulative Fatigue Damage
- Flow Blockage
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Emergency Diesel Generator System components:

- Bolting Integrity Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Selective Leaching of Materials Program

3.3.2.1.34 Floor Drains System

Materials

The materials of construction for the Floor Drains System components are:
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Gray Cast Iron
- Stainless Steel

Environment

The Floor Drains System components are exposed to the following:
- Air - Indoor Uncontrolled
- Raw Water

Aging Effects Requiring Management

The following Floor Drains System aging effects require management:
- Flow Blockage
- Loss of Material

Aging Management Programs

The following AMPs manage the aging effects for the Floor Drains System components:
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Selective Leaching of Materials Program

3.3.2.1.35 Fuel Handling System

Materials

The materials of construction for the Fuel Handling System components are:
- Stainless Steel

Environment

The Fuel Handling System components are exposed to the following:
- Air - Indoor Uncontrolled
- Treated Water

Aging Effects Requiring Management

The following Fuel Handling System aging effects require management:

- Cracking
- Loss of Material

Aging Management Programs

The following AMP manages the aging effects for the Fuel Handling System components:

- Water Chemistry Program

3.3.2.1.36 Fire Protection System

Materials

The materials of construction for the Fire Protection System components are:

- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Glass
- Gray Cast Iron
- PVC or Thermoplastics
- Stainless Steel

Environment

The Fire Protection System components are exposed to the following:

- Air - Indoor Uncontrolled
- Air - Outdoor
- Diesel Exhaust
- Dried Air
- Dry Gas
- Fire Water
- Fuel Oil
- Soil

Aging Effects Requiring Management

The following Fire Protection System aging effects require management:

- Cracking
- Cumulative Fatigue Damage
- Flow Blockage

- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Fire Protection System components:

- Aboveground Steel Tanks Program
- Bolting Integrity Program
- Boric Acid Corrosion Program
- Buried Piping and Tanks Inspection Program
- External Surfaces Monitoring Program
- Fire Protection Program
- Fire Water System Program
- Fuel Oil Chemistry
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- One-Time Inspection Program
- Selective Leaching of Materials Program

3.3.2.1.37 Hydrogen Supply System

Materials

The materials of construction for the Hydrogen Supply System components are:

- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel

Environment

The Hydrogen Supply System components are exposed to the following:

- Air - Indoor Uncontrolled
- Dry Gas

Aging Effects Requiring Management

The following Hydrogen Supply System aging effects require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Hydrogen Supply System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program

3.3.2.1.38 Instrument Air System

Materials

The materials of construction for the Instrument Air System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Fiber Glass or Fiber Reinforced Plastic
- Gray Cast Iron
- PVC or Thermoplastics
- Stainless Steel

Environment

The Instrument Air System components are exposed to the following:

- Air - Indoor Uncontrolled
- Air - Outdoor
- Closed-Cycle Cooling Water
- Dried Air
- Raw Water

Aging Effects Requiring Management

The following Instrument Air System aging effects require management:

- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Instrument Air System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Selective Leaching of Materials Program

3.3.2.1.39 Reactor Coolant Pump Lube Oil Collection System

Materials

The materials of construction for the Reactor Coolant Pump Lube Oil Collection System components are:

- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Stainless Steel

Environment

The Reactor Coolant Pump Lube Oil Collection System components are exposed to the following:

- Air - Indoor Uncontrolled
- Lubricating Oil

Aging Effects Requiring Management

The following Reactor Coolant Pump Lube Oil Collection System aging effects require management:

- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Reactor Coolant Pump Lube Oil Collection System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Lubricating Oil Analysis Program
- One-Time Inspection Program

3.3.2.1.40 Leak Rate Test System

Materials

The materials of construction for the Oily Leak Rate Test System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Stainless Steel

Environment

The Leak Rate Test System components are exposed to the following:

- Air - Indoor Uncontrolled
- Air - Outdoor

Aging Effects Requiring Management

The following Leak Rate Test System aging effects require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Leak Rate Test System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.41 Miscellaneous Drains System

Materials

The materials of construction for the Miscellaneous Drains System components are:

- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Glass

- Gray Cast Iron
- PVC or Thermoplastics

Environment

The Miscellaneous Drains System components are exposed to the following:
- Air - Indoor Uncontrolled
- Raw Water
- Treated Water

Aging Effects Requiring Management

The following Miscellaneous Drains System aging effects require management:
- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Miscellaneous Drains System components:
- Bolting Integrity Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- One-Time Inspection Program
- Selective Leaching of Materials Program
- Water Chemistry Program

3.3.2.1.42 Make Up & Purification System

Materials

The materials of construction for the Make Up & Purification System components are:
- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Cast Austenitic Stainless Steel
- Copper and Copper Alloys
- Glass
- Insulation
- Stainless Steel

Environment

The Make Up & Purification System components are exposed to the following:

- Air - Indoor Uncontrolled
- Closed Cycle Cooling Water
- Dried Air
- Dry Gas
- Lubricating Oil
- Treated Water

Aging Effects Requiring Management

The following Make Up & Purification System aging effects require management:

- Cracking
- Cumulative Fatigue Damage
- Flow Blockage
- Loss of Fracture Toughness
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Make Up & Purification System components:

- ASME Section XI Inservice Inspection , Subsections IWB, IWC, and IWD Program
- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Lubricating Oil Analysis Program
- One-Time Inspection Program
- Water Chemistry Program

3.3.2.1.43 Miscellaneous Mechanical & Structures System

Materials

The materials of construction for the Miscellaneous Mechanical & Structures System components are:

- Carbon or Low Alloy Steel

Environment

The Miscellaneous Mechanical & Structures System components are exposed to the following:

- Air - Indoor Uncontrolled
- Air - Outdoor

Aging Effects Requiring Management

The following Miscellaneous Mechanical & Structures System aging effects require management:

- Loss of Material

Aging Management Programs

The following AMPs manage the aging effects for the Miscellaneous Mechanical & Structures System components:

- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.44 Nitrogen Supply System

Materials

The materials of construction for the Nitrogen Supply System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Glass
- Stainless Steel

Environment

The Nitrogen Supply System components are exposed to the following:

- Air - Indoor Uncontrolled
- Dried Air
- Dry Gas

Aging Effects Requiring Management

The following Nitrogen Supply System aging effects require management:
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Nitrogen Supply System components:
- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.45 Penetration Cooling Auxiliary System

Materials

The materials of construction for the Penetration Cooling Auxiliary System components are:
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Galvanized Steel

Environment

The Penetration Cooling Auxiliary System components are exposed to the following:
- Air - Indoor Uncontrolled
- Raw Water

Aging Effects Requiring Management

The following Penetration Cooling Auxiliary System aging effects require management:
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Penetration Cooling Auxiliary System components:
- Bolting Integrity Program

- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.46 Reactor Building Airlock System

Materials

The materials of construction for the Reactor Building Airlock System components are:
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Stainless Steel

Environment

The Reactor Building Airlock System components are exposed to the following:
- Air - Indoor Uncontrolled
- Air - Outdoor

Aging Effects Requiring Management

The following Reactor Building Airlock System aging effects require management:
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Reactor Building Airlock System components:
- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.47 Roof Drains System

Materials

The materials of construction for the Roof Drains System components are:
- Carbon or Low Alloy Steel
- PVC of Thermoplastics

Environment

The Roof Drains System components are exposed to the following:

- Air - Indoor Uncontrolled
- Raw Water

Aging Effects Requiring Management

The following Roof Drains System aging effects require management:

- Flow Blockage
- Hardening and Loss of Strength
- Loss of Material

Aging Management Programs

The following AMPs manage the aging effects for the Roof Drains System components:

- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.48 Radiation Monitoring System

Materials

The materials of construction for the Radiation Monitoring System components are:

- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Elastomers
- Glass
- Stainless Steel

Environment

The Radiation Monitoring System components are exposed to the following:

- Air - Indoor Uncontrolled
- Air - Outdoor

Aging Effects Requiring Management

The following Radiation Monitoring System aging effects require management:

- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Radiation Monitoring System components:

- Bolting Integrity Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.49 Nuclear Service and Decay Heat Sea Water System

Materials

The materials of construction for the Nuclear Service and Decay Heat Sea Water System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Elastomers
- Fiber Glass or Fiber Reinforced Plastic
- Glass
- Gray Cast Iron
- Reinforced Concrete
- Stainless Steel

Environment

The Nuclear Service and Decay Heat Sea Water System components are exposed to the following:

- Air - Indoor Uncontrolled
- Closed-Cycle Cooling Water
- Dried Air
- Open-Cycle Cooling Water
- Raw Water
- Soil

Aging Effects Requiring Management

The following Nuclear Service and Decay Heat Sea Water System aging effects require management:

- Change in Material Properties
- Cracking
- Flow Blockage
- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Nuclear Service and Decay Heat Sea Water System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Buried Piping and Tanks Inspection Program
- Closed-Cycle Cooling Water System Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Open-Cycle Cooling Water System Program
- Selective Leaching of Materials Program
- Structures Monitoring Program

3.3.2.1.50 Station Air System

Materials

The materials of construction for the Station Air System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Fiber Glass or Fiber Reinforced Plastic
- Galvanized Steel
- PVC or Thermoplastics
- Stainless Steel

Environment

The Station Air System components are exposed to the following:

- Air - Indoor Uncontrolled
- Air - Outdoor
- Dried Air
- Raw Water

Aging Effects Requiring Management

The following Station Air System aging effects require management:

- Cracking
- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Station Air System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.51 Secondary Services Closed Cycle Cooling Water System

Materials

The materials of construction for the Secondary Services Closed Cycle Cooling Water System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Elastomers
- Glass
- Gray Cast Iron
- Stainless Steel
- Titanium

Environment

The Secondary Services Closed Cycle Cooling Water System components are exposed to the following:

- Air - Indoor Uncontrolled
- Closed-Cycle Cooling Water
- Dried Air
- Dry Gas
- Lubricating Oil
- Raw Water

Aging Effects Requiring Management

The following Secondary Services Closed Cycle Cooling Water System aging effects require management:

- Cracking
- Flow Blockage
- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Secondary Services Closed Cycle Cooling Water System components:

- Bolting Integrity Program
- Closed-Cycle Cooling Water System Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Lubricating Oil Analysis Program
- One-Time Inspection Program
- Selective Leaching of Materials Program

3.3.2.1.52 Station Drains System

Materials

The materials of construction for the Station Drains System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel

- Copper and Copper Alloys
- Elastomers
- Gray Cast Iron
- Stainless Steel

Environment

The Station Drains System components are exposed to the following:

- Air - Indoor Uncontrolled
- Dried Air
- Raw Water
- Treated Water

Aging Effects Requiring Management

The following Station Drains System aging effects require management:

- Flow Blockage
- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Station Drains System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- One-Time Inspection Program
- Selective Leaching of Materials Program
- Water Chemistry Program

3.3.2.1.53 Spent Fuel Cooling System

Materials

The materials of construction for the Spent Fuel Cooling System components are:

- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Glass
- Insulation

- Stainless Steel

Environment

The Spent Fuel Cooling System components are exposed to the following:
- Air - Indoor Uncontrolled
- Closed-Cycle Cooling Water
- Treated Water

Aging Effects Requiring Management

The following Spent Fuel Cooling System aging effects require management:
- Cracking
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Spent Fuel Cooling System components:
- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System Program
- External Surfaces Monitoring Program
- Water Chemistry Program

3.3.2.1.54 Nuclear Services Closed Cycle Cooling System

Materials

The materials of construction for the Nuclear Services Closed Cycle Cooling System components are:
- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Elastomers
- Glass
- Gray Cast Iron
- Insulation
- Stainless Steel

Environment

The Nuclear Services Closed Cycle Cooling System components are exposed to the following:

- Air - Indoor Uncontrolled
- Closed-Cycle Cooling Water
- Dried Air
- Dry Gas
- Lubricating Oil
- Open-Cycle Cooling Water
- Raw Water
- Treated Water

Aging Effects Requiring Management

The following Nuclear Services Closed Cycle Cooling System aging effects require management:

- Flow Blockage
- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Nuclear Services Closed Cycle Cooling System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Lubricating Oil Analysis Program
- One-Time Inspection Program
- Open-Cycle Cooling Water System Program
- Selective Leaching of Materials Program
- Water Chemistry Program

3.3.2.1.55 Waste Disposal System

Materials

The materials of construction for the Waste Disposal System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Glass
- Stainless Steel

Environment

The Waste Disposal System components are exposed to the following:

- Air - Indoor Uncontrolled
- Dried Air
- Dry Gas
- Raw Water
- Treated Water

Aging Effects Requiring Management

The following Waste Disposal System aging effects require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Waste Disposal System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- One-Time Inspection Program
- Water Chemistry Program

3.3.2.1.56 Radioactive Gas Waste Disposal System

Materials

The materials of construction for the Radioactive Gas Waste Disposal System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Glass
- Stainless Steel

Environment

The Radioactive Gas Waste Disposal System components are exposed to the following:

- Air - Indoor Uncontrolled
- Dried Air
- Dry Gas
- Raw Water
- Treated Water

Aging Effects Requiring Management

The following Radioactive Gas Waste Disposal System aging effects require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Radioactive Gas Waste Disposal System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- One-Time Inspection Program
- Water Chemistry Program

3.3.2.1.57 Radioactive Liquid Waste Disposal System

Materials

The materials of construction for the Radioactive Liquid Waste Disposal System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Glass
- Insulation
- Stainless Steel

Environment

The Radioactive Liquid Waste Disposal System components are exposed to the following:

- Air - Indoor Uncontrolled
- Dried Air
- Raw Water

Aging Effects Requiring Management

The following Radioactive Liquid Waste Disposal System aging effects require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Radioactive Liquid Waste Disposal System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Selective Leaching of Materials Program

3.3.2.1.58 Reactor Coolant and Miscellaneous Waste Evaporator System

Materials

The materials of construction for the Reactor Coolant and Miscellaneous Waste Evaporator System components are:

- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Stainless Steel

Environment

The Reactor Coolant and Miscellaneous Waste Evaporator System components are exposed to the following:

- Air - Indoor Uncontrolled
- Dry Gas

Aging Effects Requiring Management

The following Reactor Coolant and Miscellaneous Waste Evaporator System aging effects require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Reactor Coolant and Miscellaneous Waste Evaporator System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program

3.3.2.1.59 Waste Gas Sampling System

Materials

The materials of construction for the Waste Gas Sampling System components are:

- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Stainless Steel

Environment

The Waste Gas Sampling System components are exposed to the following:

- Air - Indoor Uncontrolled
- Treated Water

Aging Effects Requiring Management

The following Waste Gas Sampling System aging effects require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Waste Gas Sampling System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- One-Time Inspection Program
- Water Chemistry Program

3.3.2.1.60 Waste Sampling System

Materials

The materials of construction for the Waste Sampling System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Copper and Copper Alloys
- Stainless Steel

Environment

The Waste Sampling System components are exposed to the following:

- Air - Indoor Uncontrolled
- Dried Air
- Raw Water

Aging Effects Requiring Management

The following Waste Sampling System aging effects require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Waste Sampling System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.61 Post Accident Containment Atmospheric Sampling

Materials

The materials of construction for the Post Accident Containment Atmospheric Sampling components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Copper and Copper Alloys
- Stainless Steel

Environment

The Post Accident Containment Atmospheric Sampling components are exposed to the following:

- Air - Indoor Uncontrolled
- Dried Air
- Raw Water

Aging Effects Requiring Management

The following Post Accident Containment Atmospheric Sampling aging effects require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Post Accident Containment Atmospheric Sampling components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.2 Further Evaluation of Aging Management as Recommended by NUREG-1801

NUREG-1801 identifies aging management activities that warrant further evaluation. For the Auxiliary Systems, those activities are addressed in the following subsections.

3.3.2.2.1 Cumulative Fatigue Damage

Fatigue is a TLAA as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c)(1). The evaluation of the TLAAs for piping, piping components, and piping elements is addressed separately in Section 4.3. With regard to cranes, load handling members subjected to fatigue loading conditions such as crane runways are accounted for by design. In addition, crane use is limited and the number of stress cycles experienced is low in terms of fatigue service life when considering the period of extended operation. Therefore, no TLAA exists for fatigue of crane components.

3.3.2.2.2 Reduction of Heat Transfer Due to Fouling

Reduction of heat transfer due to fouling could occur for stainless steel heat exchanger tubes exposed to treated water. NUREG-1800 and NUREG-1801 incorrectly identify this item as applicable to BWR and PWR nuclear power plants. However, unique items VII.A4-4 (AP-62) and VII.E3-6 (AP-62) apply to BWR plants only.

3.3.2.2.3 Cracking Due to Stress Corrosion Cracking (SCC)

3.3.2.2.3.1 BWR Standby Liquid Control Piping, Piping Components, and Piping Elements

Cracking of BWR Standby Liquid Control piping components is applicable to BWR plants only.

3.3.2.2.3.2 BWR RWCU Heat Exchanger Components Exposed to Treated Water

NUREG-1800 and NUREG-1801 incorrectly state that this item is applicable to both PWR and BWR nuclear power plants. However, unique items VII.E3-3 (A-71) and VII.E3-19 (A-85) apply to BWR systems only, i.e., the Reactor Water Cleanup System.

3.3.2.2.3.3 Stainless Steel Diesel Engine Exhaust Piping, Piping Components, and Piping Elements Exposed to Diesel Exhaust

Cracking due to SCC could occur in stainless steel diesel engine exhaust piping, piping components, and piping elements exposed to diesel exhaust. The carbon steel Emergency Diesel Generator System diesel engine exhaust piping contains stainless steel expansion joints. Cracking due to SCC of the expansion joints is managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program. The program includes visual inspections to assure that existing environmental conditions are not causing material degradation that could result in a loss of component intended functions.

3.3.2.2.4 Cracking Due to Stress Corrosion Cracking and Cyclic Loading

3.3.2.2.4.1 Chemical and Volume Control System Non-Regenerative Heat Exchanger Components

Cracking due to SCC and cyclic loading could occur in stainless steel non-regenerative heat exchanger components exposed to treated water greater than 140°F in the Make Up & Purification System. CR-3 manages cracking of Make Up & Purification System letdown heat exchanger components with the Water Chemistry Program and the One-Time Inspection Program. The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the prevention or mitigation of the cracking and loss of material aging effects. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation. The One-Time Inspection Program is selected in lieu of radioactivity monitoring of the shell side water and eddy current testing of tubes.

This position was found acceptable to the NRC staff in NUREG-1785, Safety Evaluation Report Related to the License Renewal of H.B. Robinson Steam Electric Plant, Unit 2. Section 3.3.2.2.8 of the Safety Evaluation Report states:

> In LRA Table 3.3-1, row 8 the applicant stated that SCC is an applicable aging mechanism for the seal water, excess letdown, and regenerative heat exchangers.
>
> The applicant credited the Water Chemistry Program for managing the crack initiation and growth due to SCC in these heat exchangers and the Closed-Cycle Cooling Water System Program for managing the aging effect for heat exchangers cooled by the CCW system. To verify the effectiveness of the Water Chemistry Program in preventing cracking due to SCC, the applicant credited an inspection of small-bore Class 1 piping system and components connected to the RCS under the One-Time Inspection Program in selected locations where degradation would be expected. The applicant stated that management of SCC for this group is consistent with the GALL Report with the exception that the one-time inspection will be used instead of the eddy current testing recommended in the GALL Report. The Water Chemistry Program and the One-Time Inspection Program are evaluated in Sections 3.0.3.3 and 3.0.3.9 of this SER. The staff finds that these programs can effectively manage the cracking initiation and

growth due to SCC for the above components that are applicable to RNP auxiliary systems.

On the basis of its review, the staff finds that the applicant has adequately evaluated the management of crack initiation and growth due to SCC and cyclic loading for components in the auxiliary systems, as recommended in the GALL Report. On the basis of this finding, and the finding that the remainder of the applicant's program is consistent with GALL, the staff concludes that the applicant has demonstrated that these aging effects will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation.

3.3.2.2.4.2 Chemical and Volume Control System Regenerative Heat Exchanger Components

Table 3.3.1, Item 3.3.1-08 is not applicable to CR-3. CR-3 does not have regenerative heat exchangers in the Make Up & Purification System.

3.3.2.2.4.3 Chemical and Volume Control System Stainless Steel Pump Casing

CR-3 manages cracking of the high pressure pumps in the Make Up & Purification System with a combination of the Water Chemistry Program and the One-Time Inspection Program. The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the prevention or mitigation of the cracking aging effect. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.3.2.2.4.4 Chemical and Volume Control System Pump Casing High Strength Closure Bolting

Cracking of high strength closure bolting could occur for Make Up & Purification System bolting exposed to steam or water leakage. Although there have been industry instances of cracking of carbon steel and low-alloy steel bolting due to SCC, these failures have been attributed to high yield strength materials (>150 ksi), leaking gaskets, and exposure to contaminants such as lubricants containing molybdenum disulfide. CR-3 selects proper bolting material in conjunction with the proper selection of lubricants and controls application of bolt torque. These measures have been effective in eliminating SCC of bolting. Industry data and plant-specific operating experience support this conclusion.

3.3.2.2.5 Hardening and Loss of Strength Due to Elastomer Degradation

3.3.2.2.5.1 Control Room Area Ventilation System Elastomer Seals and Components Exposed to Air - Indoor Uncontrolled (Internal/External)

Hardening and loss of strength due to elastomer degradation could occur in elastomer seals and components of HVAC systems exposed to indoor air on internal or external surfaces. CR-3 manages the internal surfaces of the elastomer seals and components of ventilation systems with the Inspection Of Internal Surfaces In Miscellaneous Piping And Ducting Components Program. These internal inspections are performed during the periodic system and component surveillances or during the performance of maintenance activities when the surfaces are made accessible for visual inspection. The program includes visual inspections to assure that existing environmental conditions are not causing material degradation that could result in a loss of component intended functions.

CR-3 manages the external surfaces of the elastomer seals and components of ventilation systems with the External Surfaces Monitoring Program. The External Surfaces Monitoring Program is based on system inspections and walkdowns. This program consists of periodic visual inspections of steel components such as piping, piping components, ducting, and other components within the scope of license renewal and subject to AMR in order to manage aging effects. The program manages aging effects through visual inspection of external surfaces for evidence of material degradation that could result in a loss of component intended functions.

3.3.2.2.5.2 Spent Fuel Pool Cooling and Cleanup Components with Elastomer Lining

For PWRs, unique item VII.A3-1 (A-15) is relevant. This unique item evaluates Spent Fuel Pool Cooling and Cleanup steel components with elastomer lining. CR-3 Spent Fuel Pool Cooling and Cleanup components do not have elastomer lining. Therefore, this item is not applicable.

3.3.2.2.6 Reduction of Neutron Absorbing Capacity and Loss of Material Due to General Corrosion

The AMR determined that there has been no adverse operating experience at CR-3 with regard to reduction of neutron absorbing capacity and loss of material due to general corrosion for Boral used in the spent fuel storage racks exposed to treated water or treated borated water. Both the Virgil C. Summer Nuclear Plant and the Brunswick Steam Electric Plant have been evaluated for these aging effects by the NRC staff. The Safety Evaluation Reports for License Renewal (i.e., NUREG-1787, for Summer, and NUREG-1856, for Brunswick) determined the aging effect to be insignificant. Therefore, it is concluded that these aging effects for Boral do not require aging management.

3.3.2.2.7 Loss of Material Due to General, Pitting, and Crevice Corrosion

3.3.2.2.7.1 Steel Piping, Piping Components and Piping Elements Exposed to Lubricating Oil

Loss of material due to general, pitting, and crevice corrosion could occur in steel components including the reactor coolant pump lube oil leakage collection system exposed to lubricating oil. Affected components may include piping, tubing, valves, and tanks. CR-3 manages piping components exposed to lubricating oil with a combination of the Lubricating Oil Analysis Program and the One-Time Inspection Program. The Lubricating Oil Analysis Program maintains oil systems contaminants (primarily water and particulates) within acceptable limits, thereby preserving an environment that is not conducive to loss of material, cracking or reduction of heat transfer. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

A one-time inspection of the lower portion of the reactor coolant pump oil collection tanks will be performed to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

3.3.2.2.7.2 BWR RWCU and Shutdown Cooling System Piping, Piping Components and Piping Elements Exposed to Treated Water

Loss of material for BWR Reactor Water Cleanup and Shutdown Cooling System piping components exposed to treated water is applicable to BWR plants only.

3.3.2.2.7.3 Diesel Engine Exhaust Piping, Piping Components, and Piping Elements Exposed to Diesel Exhaust

Loss of material due to general (steel only), pitting, and crevice corrosion could occur in steel and stainless steel diesel exhaust piping, piping components, and piping elements exposed to diesel exhaust. CR-3 manages the internal surfaces of piping components exposed to diesel exhaust with the Inspection Of Internal Surfaces In Miscellaneous Piping And Ducting Components Program. These internal inspections are performed during the periodic system and component surveillances or during the performance of maintenance activities when the surfaces are made accessible for visual inspection. The program includes visual inspections to assure that existing environmental conditions are not causing material degradation that could result in a loss of component intended functions.

3.3.2.2.8 External Surfaces of Piping, Piping Components, and Piping Elements Exposed to Soil

Loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion (MIC) could occur for steel piping, piping components, and piping elements, buried in soil regardless of the presence of pipe coatings or wrappings. CR-3 manages the external surfaces of piping components exposed to soil with the Buried Piping and Tanks Inspection Program. The program includes (a) preventive measures to mitigate degradation (e.g., coatings and wrappings required by design) and (b) visual inspections of external surfaces of buried piping components, when excavated, for evidence of coating damage and degradation.

3.3.2.2.9 Loss of Material Due to General, Pitting, Crevice, MIC, and Fouling

3.3.2.2.9.1 Piping, Piping Components, and Piping Elements exposed to Fuel Oil

Loss of material due to general, pitting, crevice, MIC and fouling could occur for steel piping, piping components, and piping elements, and tanks exposed to fuel oil. CR-3 manages piping components and tanks exposed to fuel oil with a combination of the Fuel Oil Chemistry Program and the One-Time Inspection Program. The Fuel Oil Chemistry Program maintains fuel oil quality by monitoring and controlling fuel oil contamination in accordance with the plant's technical specifications and the guidelines of the American Society for Testing Materials. Exposure to fuel oil contaminants, such as water and microbiological organisms, is minimized by periodic draining or cleaning of tanks and by verifying the quality of new oil before its introduction into the storage tanks. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.3.2.2.9.2 Emergency Diesel Generator Heat Exchanger Components Exposed to Lubricating Oil

Loss of material due to general, pitting, crevice, MIC, and fouling could occur for steel heat exchanger components exposed to lubricating oil. CR-3 manages piping components exposed to lubricating oil with the Lubricating Oil Analysis Program and the One-Time Inspection Program. The Lubricating Oil Analysis Program maintains oil systems contaminants (primarily water and particulates) within acceptable limits, thereby preserving an environment that is not conducive to loss of material, cracking or reduction of heat transfer. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.3.2.2.10 Loss of Material Due to Pitting and Crevice Corrosion

3.3.2.2.10.1 Spent Fuel Pool Cooling and Cleanup Steel Components with Elastomer Lining or Stainless Steel Cladding

For PWRs, unique item VII.A3-9 (A-39) is relevant. This unique item evaluates Spent Fuel Pool Cooling and Cleanup steel components with elastomer lining. CR-3 Spent Fuel Pool Cooling and Cleanup components do not have elastomer lining. Therefore, this item is not applicable.

3.3.2.2.10.2 BWR Spent Fuel Pool Cooling and Cleanup, RWCU and Shutdown Cooling Piping, Piping Components and Piping Elements Exposed to Treated Water

Loss of material for BWR Spent Fuel Pool Cooling and Cleanup, Reactor Water Cleanup, and Shutdown Cooling System piping components exposed to treated water is applicable to BWR plants only. NUREG-1800 incorrectly identifies this item as applicable to BWR and PWR plants. Unique items VII.A4-11, VII.E3-15, VII.E4-14, VII.A4-5, VII.E3-7, and VII.E4-4 apply only to BWR plants.

3.3.2.2.10.3 External Surfaces of Ventilation System Components Exposed to Condensation

Table 3.3.1, Item Number 3.3.1-25 is not applicable to CR-3. This component, material, environment, and aging effect/mechanism does not apply to CR-3 ventilation system piping, piping components, and piping elements.

3.3.2.2.10.4 Piping, Piping Components, and Piping Elements Exposed to Lubricating Oil

Loss of material due to pitting and crevice corrosion could occur for copper alloy piping, piping components, and piping elements exposed to lubricating oil. CR-3 manages piping components exposed to lubricating oil with a combination of two programs: the Lubricating Oil Analysis Program and the One-Time Inspection Program. The Lubricating Oil Analysis Program maintains oil systems contaminants (primarily water and particulates) within acceptable limits, thereby preserving an environment that is not conducive to loss of material, cracking or reduction of heat transfer. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.3.2.2.10.5 Ventilation System Piping, Piping Components, and Piping Elements exposed to Condensation

Loss of material due to pitting and crevice corrosion could occur for stainless steel HVAC ducting and components exposed to condensation. The Inspection Of Internal Surfaces In Miscellaneous Piping And Ducting Components Program will be used to manage loss of material due to pitting and crevice corrosion of internal surfaces of stainless steel HVAC housings exposed to condensation.

3.3.2.2.10.6 Fire Protection Copper Alloy Piping, Piping Components, and Piping Elements Exposed to Condensation (Internal)

Loss of material due to pitting and crevice corrosion could occur for copper alloy fire protection system piping, piping components, and piping elements exposed to internal condensation. CR-3 considers that a condensing environment has the capability to concentrate contaminants; therefore, a raw water environment was assumed for these components. The Fire Water System Program is used to manage loss of material due to pitting and crevice corrosion of CR-3 Fire Protection System copper alloy components (Refer to Table 3.3.1, Item 3.3.1-70). The Fire Water System Program includes system pressure monitoring, wall thickness evaluations, periodic flow and pressure testing in accordance with applicable NFPA commitments and periodic visual inspection of overall system condition.

3.3.2.2.10.7 External Surfaces of Stainless Steel Piping, Piping Components, and Piping Elements exposed to Soil

Loss of material due to pitting and crevice corrosion could occur for stainless steel piping, piping components, and piping elements exposed to soil. The systems containing service water and the Fire Protection, Diesel Fuel Oil, and Emergency Diesel Generator Systems do not contain stainless steel components exposed to soil. Therefore, this item is not applicable to CR-3.

3.3.2.2.10.8 BWR Standby Liquid Control Piping, Piping Components, and Piping Elements Exposed to Sodium Pentaborate

Loss of material for BWR Standby Liquid Control System piping components exposed to treated water is applicable to BWR plants only.

3.3.2.2.11 <u>BWR Spent Fuel Pool Cooling and Cleanup, RWCU and Shutdown Cooling Copper Alloy Piping, Piping Components and Piping Elements Exposed to Treated Water</u>

This item is applicable to BWRs only. Loss of material for BWR Standby Liquid Control, Spent Fuel Pool Cooling and Cleanup, Reactor Water Cleanup, and Shutdown Cooling System copper alloy piping components exposed to treated water is applicable to BWR plants only.

3.3.2.2.12 Loss of Material Due to Pitting, Crevice, and Microbiologically-Influenced Corrosion

3.3.2.2.12.1 Piping, Piping Components, and Piping Elements exposed to Fuel Oil

Loss of material due to pitting, crevice, and MIC could occur in stainless steel, aluminum, and copper alloy piping, piping components, and piping elements exposed to fuel oil. CR-3 manages piping components exposed to fuel oil with a combination of the Fuel Oil Chemistry Program and the One-Time Inspection Program. The Fuel Oil Chemistry Program maintains fuel oil quality by monitoring and controlling fuel oil contamination in accordance with the plant's technical specifications and the guidelines of the American Society for Testing Materials. Exposure to fuel oil contaminants, such as water and microbiological organisms, is minimized by periodic draining or cleaning of tanks and by verifying the quality of new oil before its introduction into the storage tanks. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.3.2.2.12.2 Stainless Steel Piping, Piping Components, and Piping Elements exposed to Lubricating Oil

Loss of material due to pitting, crevice, and MIC could occur in stainless steel, piping, piping components, and piping elements exposed to lubricating oil. CR-3 manages piping components exposed to lubricating oil with the Lubricating Oil Analysis Program and the One-Time Inspection Program. The Lubricating Oil Analysis Program maintains oil systems contaminants (primarily water and particulates) within acceptable limits, thereby preserving an environment that is not conducive to loss of material, cracking or reduction of heat transfer. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.3.2.2.13 Loss of Material due to Wear of Ventilation System Elastomers

Loss of material due to wear could occur in elastomer seals and components in an indoor air environment. CR-3 manages the internal surfaces of the ventilation system components with the Inspection Of Internal Surfaces In Miscellaneous Piping And Ducting Components Program. These internal inspections are performed during the periodic system and component surveillances or during the performance of maintenance activities when the surfaces are made accessible for visual inspection. The program includes visual inspections to assure that existing environmental conditions are not causing material degradation that could result in a loss of component intended functions.

CR-3 manages the external surfaces of the ventilation system components with the External Surfaces Monitoring Program. The External Surfaces Monitoring Program is based on system inspections and walkdowns. This program consists of periodic visual inspections of steel components such as piping, piping components, ducting, and other components within the scope of license renewal and subject to AMR in order to manage aging effects. The program manages aging effects through visual inspection of external surfaces for evidence of material loss.

3.3.2.2.14 Loss of Material Due to Cladding Breach

Table 3.3.1, Item Number 3.3.1-35 is not applicable to CR-3. The charging pumps at CR-3 are fabricated from stainless steel and not from carbon steel with stainless steel cladding. Therefore, loss of material due to cladding breach is not applicable.

3.3.2.2.15 Quality Assurance for Aging Management of Non-Safety Related Components

QA provisions applicable to License Renewal are discussed in Section B.1.3.

3.3.2.3 Time-Limited Aging Analysis

The Time-Limited Aging Analyses (TLAA) identified below are associated with the Auxiliary Systems components. The section of the application that contains the TLAA review results is indicated in parenthesis.

1. Metal Fatigue (Section 4.3)

3.3.3 CONCLUSIONS

The Auxiliary Systems components/commodities having aging effects requiring management have been evaluated, and aging management programs have been selected to manage the aging effects. A description of the aging management programs is provided in Appendix B, along with a demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the demonstration provided in Appendix B, the effects of aging will be adequately managed so that there is reasonable assurance that the intended functions of Auxiliary Systems components/commodities will be maintained consistent with the current licensing basis during the period of extended operation.

TABLE 3.3.1 SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-01	Steel cranes - structural girders exposed to air – indoor uncontrolled (external)	Cumulative fatigue damage	TLAA to be evaluated for structural girders of cranes. See the Standard Review Plan, Section 4.7 for generic guidance for meeting the requirements of 10 CFR 54.21(c)(1).	Yes, TLAA	Fatigue of crane structural girders is not a TLAA. The discussion in Subsection 3.3.2.2.1 provides the basis for this conclusion.
3.3.1-02	Steel and stainless steel piping, piping components, piping elements, and heat exchanger components exposed to air – indoor uncontrolled, treated borated water or treated water	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue of metal components is addressed as a TLAA. Further evaluation is documented in Subsection 3.3.2.2.1.
3.3.1-03	BWR Only				This item is not applicable to PWRs. Further evaluation is documented in Subsection 3.3.2.2.2.
3.3.1-04	BWR Only				
3.3.1-05	BWR Only				This item is not applicable to PWRs. Further evaluation is documented in Subsection 3.3.2.2.3.2.
3.3.1-06	Stainless steel diesel engine exhaust piping, piping components, and piping elements exposed to diesel exhaust	Cracking due to stress corrosion cracking	Plant specific	Yes, plant specific	Cracking due to SCC of the stainless steel expansion joint is managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program. Further evaluation is documented in Subsection 3.3.2.2.3.3.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-07	Stainless steel non-regenerative heat exchanger components exposed to treated borated water >60°C (>140°F)	Cracking due to stress corrosion cracking and cyclic loading	Water Chemistry and a plant-specific verification program. An acceptable verification program is to include temperature and radioactivity monitoring of the shell side water, and eddy current testing of tubes.	Yes, plant specific	CR-3 manages cracking of Make Up & Purification System heat exchanger components with a combination of the Water Chemistry Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.3.2.2.4.1.
3.3.1-08	Stainless steel regenerative heat exchanger components exposed to treated borated water >60°C (>140°F)	Cracking due to stress corrosion cracking and cyclic loading	Water Chemistry and a plant-specific verification program. The AMP is to be augmented by verifying the absence of cracking due to stress corrosion cracking and cyclic loading. A plant specific aging management program is to be evaluated.	Yes, plant specific	This item is not applicable to CR-3. Further evaluation is documented in Subsection 3.3.2.2.4.2.
3.3.1-09	Stainless steel high-pressure pump casing in PWR chemical and volume control system	Cracking due to stress corrosion cracking and cyclic loading	Water Chemistry and a plant-specific verification program. The AMP is to be augmented by verifying the absence of cracking due to stress corrosion cracking and cyclic loading. A plant specific aging management program is to be evaluated.	Yes, plant specific	The plant-specific AMPs that manage the aging effect are the Water Chemistry Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.3.2.2.4.3.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-10	High-strength steel closure bolting exposed to air with steam or water leakage.	Cracking due to stress corrosion cracking, cyclic loading	Bolting Integrity The AMP is to be augmented by appropriate inspection to detect cracking if the bolts are not otherwise replaced during maintenance.	Yes, if the bolts are not replaced during maintenance	This item is not applicable to CR-3. Further evaluation is documented in Subsection 3.3.2.2.4.4.
3.3.1-11	Elastomer seals and components exposed to air – indoor uncontrolled (internal/external)	Hardening and loss of strength due to elastomer degradation	Plant specific	Yes, plant specific	The plant-specific AMPs used to manage the aging effects are the External Surfaces Monitoring Program and the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program. Further evaluation is documented in Subsection 3.3.2.2.5.1.
3.3.1-12	Elastomer lining exposed to treated water or treated borated water	Hardening and loss of strength due to elastomer degradation	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant specific	This item is not applicable to CR-3. CR-3 Spent Fuel Pool Cooling components do not have elastomer lining. Further evaluation is documented in Subsection 3.3.2.2.5.2.
3.3.1-13	Boral, boron steel spent fuel storage racks neutron-absorbing sheets exposed to treated water or treated borated water	Reduction of neutron-absorbing capacity and loss of material due to general corrosion	Plant specific	Yes, plant specific	Reduction of neutron-absorbing capacity and loss of material due to general corrosion do not require aging management. Further evaluation is documented in Subsection 3.3.2.2.6.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-14	Steel piping, piping component, and piping elements exposed to lubricating oil	Loss of material due to general, pitting, and crevice corrosion	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. CR-3 manages the aging effect with a combination of Lubricating Oil Analysis Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.3.2.2.7.1.
3.3.1-15	Steel reactor coolant pump oil collection system piping, tubing, and valve bodies exposed to lubricating oil	Loss of material due to general, pitting, and crevice corrosion	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. CR-3 manages the aging effect with a combination of Lubricating Oil Analysis Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.3.2.2.7.1.
3.3.1-16	Steel reactor coolant pump oil collection system tank exposed to lubricating oil	Loss of material due to general, pitting, and crevice corrosion	Lubricating Oil Analysis and One-Time Inspection to evaluate the thickness of the lower portion of the tank	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. CR-3 manages the aging effect with a combination of Lubricating Oil Analysis Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.3.2.2.7.1.
3.3.1-17	BWR Only				
3.3.1-18	Stainless steel and steel diesel engine exhaust piping, piping components, and piping elements exposed to diesel exhaust	Loss of material/ general (steel only), pitting and crevice corrosion	Plant specific	Yes, plant specific	The plant-specific AMP used to manage the aging effect is the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program. Further evaluation is documented in Subsection 3.3.2.2.7.3.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-19	Steel (with or without coating or wrapping) piping, piping components, and piping elements exposed to soil	Loss of material due to general, pitting, crevice, and microbiological-ly influenced corrosion	Buried Piping and Tanks Surveillance or Buried Piping and Tanks Inspection	No Yes, detection of aging effects and operating experience are to be further evaluated	Consistent with NUREG-1801. CR-3 manages the aging effect with the Buried Piping and Tanks Inspection Program. Further evaluation is documented in Subsection 3.3.2.2.8.
3.3.1-20	Steel piping, piping components, piping elements, and tanks exposed to fuel oil	Loss of material due to general, pitting, crevice, and microbiological-ly influenced corrosion, and fouling	Fuel Oil Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	CR-3 manages the aging effect with a combination of Fuel Oil Chemistry Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.3.2.2.9.1.
3.3.1-21	Steel heat exchanger components exposed to lubricating oil	Loss of material due to general, pitting, crevice, and microbiological-ly influenced corrosion, and fouling	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. CR-3 manages the aging effect with a combination of Lubricating Oil Analysis Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.3.2.2.9.2.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-22	Steel with elastomer lining or stainless steel cladding piping, piping components, and piping elements exposed to treated water and treated borated water	Loss of material due to pitting and crevice corrosion (only for steel after lining/cladding degradation)	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	This item is not applicable. CR-3 Spent Fuel Pool Cooling components do not have an elastomer lining. Further evaluation is documented in Subsection 3.3.2.2.10.1.
3.3.1-23	BWR Only				
3.3.1-24	BWR Only				This item is not applicable to PWRs as documented in Subsection 3.3.2.2.10.2.
3.3.1-25	Copper alloy HVAC piping, piping components, piping elements exposed to condensation (external)	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific	This item is not applicable to CR-3 as documented in Subsection 3.3.2.2.10.3.
3.3.1-26	Copper alloy piping, piping components, and piping elements exposed to lubricating oil	Loss of material due to pitting and crevice corrosion	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. CR-3 manages the aging effect with a combination of Lubricating Oil Analysis Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.3.2.2.10.4.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-27	Stainless steel HVAC ducting and aluminum HVAC piping, piping components and piping elements exposed to condensation	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific	CR-3 manages the aging effect with the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program. Further evaluation is documented in Subsection 3.3.2.2.10.5.
3.3.1-28	Copper alloy fire protection piping, piping components, and piping elements exposed to condensation (internal)	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific	This item is not applicable to CR-3. CR-3 evaluates this as a raw water internal environment; refer to Subsection 3.3.2.2.10.6.
3.3.1-29	Stainless steel piping, piping components, and piping elements exposed to soil	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific	This item is not applicable to CR-3. Further evaluation is documented in Subsection 3.3.2.2.10.7.
3.3.1-30	BWR Only				
3.3.1-31	BWR Only				
3.3.1-32	Stainless steel, aluminum and copper alloy piping, piping components, and piping elements exposed to fuel oil	Loss of material due to pitting, crevice, and microbiological-ly influenced corrosion	Fuel Oil Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	CR-3 manages the aging effect with a combination of Fuel Oil Chemistry Program and the One-Time Inspection Program. Subsection 3.3.2.2.12.1 provides further evaluation.
3.3.1-33	Stainless steel piping, piping components, and piping elements exposed to lubricating oil	Loss of material due to pitting, crevice, and microbiological-ly influenced corrosion	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. CR-3 manages the aging effect with a combination of Lubricating Oil Analysis Program and the One-Time Inspection Program. Further evaluation is provided in Subsection 3.3.2.2.12.2.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-34	Elastomer seals and components exposed to air – indoor uncontrolled (internal or external)	Loss of material due to Wear	Plant specific	Yes, plant specific	The plant-specific AMP used to manage the aging effect on the external surface is the External Surfaces Monitoring Program. The plant-specific AMP used to manage the aging effect on the internal surface is the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program. Further evaluation is documented in Subsection 3.3.2.2.13.
3.3.1-35	Steel with stainless steel cladding pump casing exposed to treated borated water	Loss of material/ cladding breach	A plant-specific aging management program is to be evaluated. Reference NRC Information Notice 94-63, “Boric Acid Corrosion of Charging Pump Casings Caused by Cladding Cracks."	Yes, verify plant-specific program addresses cladding breach	This item is not applicable. The charging pumps at CR-3 are fabricated from stainless steel and not from carbon steel with stainless steel cladding. Further evaluation is documented in Subsection 3.3.2.2.14.
3.3.1-36	Boraflex spent fuel storage racks neutron-absorbing sheets exposed to treated water	Reduction of neutron-absorbing capacity due to boraflex degradation	Boraflex Monitoring	No	This item is not applicable to CR-3. The spent fuel storage racks at CR-3 do not use Boraflex neutron-absorbing sheets.
3.3.1-37	BWR Only				

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-38	BWR Only				
3.3.1-39	BWR Only				
3.3.1-40	Steel tanks in diesel fuel oil system exposed to air outdoor (external)	Loss of material due to general, pitting, and crevice corrosion	Aboveground Steel Tanks	No	This item is not applicable to CR-3. The CR-3 Main Fuel Oil Storage Tanks are buried. Other Fuel Oil Storage tanks are not in contact with the ground or are inside enclosed buildings.
3.3.1-41	High-strength steel closure bolting exposed to air with steam or water leakage	Cracking due to cyclic loading, stress corrosion cracking	Bolting Integrity	No	This item is not applicable to CR-3. The Auxiliary Systems at CR-3 do not contain high-strength steel closure bolting.
3.3.1-42	Steel closure bolting exposed to air with steam or water leakage	Loss of material due to general corrosion	Bolting Integrity	No	The CR-3 AMR methodology includes the air with steam or water leakage environment within the Air - Indoor Uncontrolled environment. Therefore, components subject to that environment have been rolled up to 3.3.1-43 below.
3.3.1-43	Steel bolting and closure bolting exposed to air – indoor uncontrolled (external) or air – outdoor (External)	Loss of material due to general, pitting, and crevice corrosion	Bolting Integrity	No	Consistent with NUREG-1801. The aging effect is managed by the Bolting Integrity Program.
3.3.1-44	Steel compressed air system closure bolting exposed to condensation	Loss of material due to general, pitting, and crevice corrosion	Bolting Integrity	No	The CR-3 AMR methodology includes the condensation environment within the Air - Indoor Uncontrolled environment. Therefore, components subject to that environment have been rolled up to 3.3.1-43 above.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-45	Steel closure bolting exposed to air – indoor uncontrolled (external)	Loss of preload due to thermal effects, gasket creep, and self-loosening	Bolting Integrity	No	Consistent with NUREG-1801. The aging effect is managed by the Bolting Integrity Program.
3.3.1-46	Stainless steel and stainless clad steel piping, piping components, piping elements, and heat exchanger components exposed to closed cycle cooling water >60°C (>140°F)	Cracking due to stress corrosion cracking	Closed-Cycle Cooling Water System	No	The aging effect is managed by the Closed-Cycle Cooling Water System Program.
3.3.1-47	Steel piping, piping components, piping elements, tanks, and heat exchanger components exposed to closed cycle cooling water	Loss of material due to general, pitting, and crevice corrosion	Closed-Cycle Cooling Water System	No	The aging effect is managed by the Closed-Cycle Cooling Water System Program.
3.3.1-48	Steel piping, piping components, piping elements, tanks, and heat exchanger components exposed to closed cycle cooling water	Loss of material due to general, pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System	No	The aging effect is managed by the Closed-Cycle Cooling Water System Program.
3.3.1-49	BWR Only				
3.3.1-50	Stainless steel piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to pitting and crevice corrosion	Closed-Cycle Cooling Water System	No	The aging effect is managed by the Closed-Cycle Cooling Water System Program.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-51	Copper alloy piping, piping components, piping elements, and heat exchanger components exposed to closed cycle cooling water	Loss of material due to pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System	No	The aging effect is managed by the Closed-Cycle Cooling Water System Program.
3.3.1-52	Steel, stainless steel, and copper alloy heat exchanger tubes exposed to closed cycle cooling water	Reduction of heat transfer due to fouling	Closed-Cycle Cooling Water System	No	The aging effect is managed by the Closed-Cycle Cooling Water System Program.
3.3.1-53	Steel compressed air system piping, piping components, and piping elements exposed to condensation (internal)	Loss of material due to general and pitting corrosion	Compressed Air Monitoring	No	This item is not applicable to CR-3. CR-3 uses the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program to manage corrosion of internal surfaces of compressed air systems that might be subject to internal condensation.
3.3.1-54	Stainless steel compressed air system piping, piping components, and piping elements exposed to internal condensation	Loss of material due to pitting and crevice corrosion	Compressed Air Monitoring	No	This item is not applicable to CR-3. CR-3 uses the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program to manage corrosion of internal surfaces of compressed air systems that might be subject to internal condensation.
3.3.1-55	Steel ducting closure bolting exposed to air – indoor uncontrolled (external)	Loss of material due to general corrosion	External Surfaces Monitoring	No	Consistent with NUREG-1801. The aging effect is managed by the External Surfaces Monitoring Program.
3.3.1-56	Steel HVAC ducting and components external surfaces exposed to air – indoor uncontrolled (external)	Loss of material due to general corrosion	External Surfaces Monitoring	No	Consistent with NUREG-1801. The aging effect is managed by the External Surfaces Monitoring Program.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-57	Steel piping and components external surfaces exposed to air – indoor uncontrolled (External)	Loss of material due to general corrosion	External Surfaces Monitoring	No	This item is not applicable to CR-3. Compressed Air System components having this material, environment and aging effect were aligned to 3.3.1-58.
3.3.1-58	Steel external surfaces exposed to air – indoor uncontrolled (external), air outdoor (external), and condensation (external)	Loss of material due to general corrosion	External Surfaces Monitoring	No	Consistent with NUREG-1801. The aging effect is managed by the External Surfaces Monitoring Program.
3.3.1-59	Steel heat exchanger components exposed to air – indoor uncontrolled (external) or air -outdoor (external)	Loss of material due to general, pitting, and crevice corrosion	External Surfaces Monitoring	No	This item is not applicable to CR-3. See Item Numbers 3.3.1-56 or 3.3.1-58.
3.3.1-60	Steel piping, piping components, and piping elements exposed to air outdoor (external)	Loss of material due to general, pitting, and crevice corrosion	External Surfaces Monitoring	No	Consistent with NUREG-1801. The aging effect is managed by the External Surfaces Monitoring Program.
3.3.1-61	Elastomer fire barrier penetration seals exposed to air – outdoor or air - indoor uncontrolled	Increased hardness, shrinkage and loss of strength due to weathering	Fire Protection	No	Consistent with NUREG-1801. The Fire Protection Program is used to manage the aging effect of change in material properties for elastomer fire barrier penetration seals. Change in material properties is considered equivalent to increased hardness, shrinkage, and loss of strength.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-62	Aluminum piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting and crevice corrosion	Fire Protection	No	This item is not applicable to CR-3.
3.3.1-63	Steel fire rated doors exposed to air – outdoor or air - indoor uncontrolled	Loss of material due to Wear	Fire Protection	No	The aging effect is managed by the Fire Protection Program and the Structures Monitoring Program for fire-rated doors.
3.3.1-64	Steel piping, piping components, and piping elements exposed to fuel oil	Loss of material due to general, pitting, and crevice corrosion	Fire Protection and Fuel Oil Chemistry	No	CR-3 manages the aging effect with a combination of the Fire Protection Program and the Fuel Oil Chemistry Program.
3.3.1-65	Reinforced concrete structural fire barriers – walls, ceilings and floors exposed to air – indoor uncontrolled	Concrete cracking and spalling due to aggressive chemical attack, and reaction with aggregates	Fire Protection and Structures Monitoring Program	No	CR-3 manages the aging effect with a combination of the Fire Protection and the Structures Monitoring Programs. For the RB cylinder wall, CR-3 manages the aging effect with the ASME Section XI, Subsection IWL Program. As discussed in 3.3.1-66 below, the thick cylinder wall, the RB liner plate, and examination by the IWL Program ensure the fire barrier function is maintained. Concrete cracking and loss of material (spalling) due to reaction with aggregates is not applicable at CR-3 as discussed in Subsection 3.5.2.2.2.1.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-66	Reinforced concrete structural fire barriers – walls, ceilings and floors exposed to air – outdoor	Concrete cracking and spalling due to freeze thaw, aggressive chemical attack, and reaction with aggregates	Fire Protection and Structures Monitoring Program	No	CR-3 manages the aging effect with a combination of the Fire Protection and the Structures Monitoring Programs. For the RB cylinder wall, the aging effect is managed by the ASME Section XI, Subsection IWL Program. The RB cylinder wall concrete is not accessible inside the RB owing to the steel liner plate. Within the AB and IB the cylinder wall is exposed to indoor air. The thick cylinder wall, the RB liner plate, and examination by the IWL Program ensure the fire barrier function is maintained. Concrete cracking and spalling due to freeze-thaw and reaction with aggregates are not applicable at CR-3. See Subsections 3.5.2.2.1.9, 3.5.2.2.1.10 and 3.5.2.2.2.1 for additional discussion.
3.3.1-67	Reinforced concrete structural fire barriers – walls, ceilings and floors exposed to air – outdoor or air - indoor uncontrolled	Loss of material due to corrosion of embedded steel	Fire Protection and Structures Monitoring Program	No	CR-3 manages the aging effect for structures and components outside of containment with a combination of the Fire Protection Program and the Structures Monitoring Program. For the RB cylinder wall, CR-3 manages the aging effect with a combination of the Fire Protection Program and the ASME Section XI, Subsection IWL Program as stated in 3.3.1-66 above.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-68	Steel piping, piping components, and piping elements exposed to raw water	Loss of material due to general, pitting, crevice, and microbiological-ly influenced corrosion, and fouling	Fire Water System	No	Consistent with NUREG-1801. The aging effect for the Fire Protection System is managed by the Fire Water System Program.
3.3.1-69	Stainless steel piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting and crevice corrosion, and fouling	Fire Water System	No	Consistent with NUREG-1801. The aging effect for the Fire Protection System is managed by the Fire Water System Program.
3.3.1-70	Copper alloy piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting, crevice, and microbiological-ly influenced corrosion, and fouling	Fire Water System	No	Consistent with NUREG-1801. The aging effect for the Fire Protection System is managed by the Fire Water System Program.
3.3.1-71	Steel piping, piping components, and piping elements exposed to moist air or condensation (Internal)	Loss of material due to general, pitting, and crevice corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	No	Consistent with NUREG-1801. The aging effect is managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-72	Steel HVAC ducting and components internal surfaces exposed to condensation (Internal)	Loss of material due to general, pitting, crevice, and (for drip pans and drain lines) microbiological-ly influenced corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	No	Consistent with NUREG-1801. The aging effect is managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program.
3.3.1-73	Steel crane structural girders in load handling system exposed to air- indoor uncontrolled (external)	Loss of material due to general corrosion	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	No	Consistent with NUREG-1801. The aging effect is managed by the Inspection of Overhead Heavy Load and Light Load Handling Systems Program.
3.3.1-74	Steel cranes - rails exposed to air – indoor uncontrolled (external)	Loss of material due to Wear	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	No	Consistent with NUREG-1801. The aging effect is managed by the Inspection of Overhead Heavy Load and Light Load Handling Systems Program.
3.3.1-75	Elastomer seals and components exposed to raw water	Hardening and loss of strength due to elastomer degradation; loss of material due to erosion	Open-Cycle Cooling Water System	No	Consistent with NUREG-1801. The aging effect is managed by the Open-Cycle Cooling Water System Program.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-76	Steel piping, piping components, and piping elements (without lining/coating or with degraded lining/coating) exposed to raw water	Loss of material due to general, pitting, crevice, and microbiological-ly influenced corrosion, fouling, and lining/coating degradation	Open-Cycle Cooling Water System	No	Consistent with NUREG-1801. The aging effect is managed by the Open-Cycle Cooling Water System Program.
3.3.1-77	Steel heat exchanger components exposed to raw water	Loss of material due to general, pitting, crevice, galvanic, and microbiological-ly influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	Consistent with NUREG-1801. The aging effect is managed by the Open-Cycle Cooling Water System Program.
3.3.1-78	Stainless steel, nickel alloy, and copper alloy piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting and crevice corrosion	Open-Cycle Cooling Water System	No	This item is not applicable to CR-3. See Item Numbers 3.3.1-79 through 3.3.1-83.
3.3.1-79	Stainless steel piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting and crevice corrosion, and fouling	Open-Cycle Cooling Water System	No	Consistent with NUREG-1801. he aging effect is managed by the Open-Cycle Cooling Water System Program.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-80	Stainless steel and copper alloy piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting, crevice, and microbiological-ly influenced corrosion	Open-Cycle Cooling Water System	No	Consistent with NUREG-1801. The aging effect is managed by the Open-Cycle Cooling Water System Program.
3.3.1-81	Copper alloy piping, piping components, and piping elements, exposed to raw water	Loss of material due to pitting, crevice, and microbiological-ly influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	Consistent with NUREG-1801. The aging effect is managed by the Open-Cycle Cooling Water System Program.
3.3.1-82	Copper alloy heat exchanger components exposed to raw water	Loss of material due to pitting, crevice, galvanic, and microbiological-ly influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	Consistent with NUREG-1801. The aging effect is managed by the Open-Cycle Cooling Water System Program.
3.3.1-83	Stainless steel and copper alloy heat exchanger tubes exposed to raw water	Reduction of heat transfer due to fouling	Open-Cycle Cooling Water System	No	Consistent with NUREG-1801. The aging effect is managed by the Open-Cycle Cooling Water System Program.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-84	Copper alloy >15% Zn piping, piping components, piping elements, and heat exchanger components exposed to raw water, treated water, or closed cycle cooling water	Loss of material due to selective leaching	Selective Leaching of Materials	No	The aging effect is managed for susceptible components using the Selective Leaching of Materials Program.
3.3.1-85	Gray cast iron piping, piping components, and piping elements exposed to soil, raw water, treated water, or closed-cycle cooling water	Loss of material due to selective leaching	Selective Leaching of Materials	No	The aging effect is managed for susceptible components using the Selective Leaching of Materials Program.
3.3.1-86	Structural steel (new fuel storage rack assembly) exposed to air – indoor uncontrolled (external)	Loss of material due to general, pitting, and crevice corrosion	Structures Monitoring Program	No	Consistent with NUREG-1801. The Structures Monitoring Program is used to manage the aging effect.
3.3.1-87	Boraflex spent fuel storage racks neutron-absorbing sheets exposed to treated borated water	Reduction of neutron-absorbing capacity due to boraflex degradation	Boraflex Monitoring	No	This item is not applicable. CR-3 does not utilize Boraflex spent fuel storage rack neutron-absorbing sheets.
3.3.1-88	Aluminum and copper alloy >15% Zn piping, piping components, and piping elements exposed to air with borated water leakage	Loss of material due to Boric acid corrosion	Boric Acid Corrosion	No	Consistent with NUREG-1801. The aging effect is managed by the Boric Acid Corrosion Program.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-89	Steel bolting and external surfaces exposed to air with borated water leakage	Loss of material due to Boric acid corrosion	Boric Acid Corrosion	No	Consistent with NUREG-1801. The aging effect is managed by the Boric Acid Corrosion Program.
3.3.1-90	Stainless steel and steel with stainless steel cladding piping, piping components, piping elements, tanks, and fuel storage racks exposed to treated borated water >60°C (>140°F)	Cracking due to stress corrosion cracking	Water Chemistry	No	Consistent with NUREG-1801. The aging effect is managed by the Water Chemistry Program. CR-3 Spent Fuel Pool (SFP) environmental conditions do not normally exceed the 140°F temperature threshold that can result in cracking due to the SCC for stainless steel components. However, site-specific OE has determined that there is a potential for SCC of the stainless steel SFP Liner Plate. Susceptibility to SCC can generally be limited to stainless steels that have relatively high carbon content. Specifically, Types 302 and 304 stainless steel can have carbon content that would increase susceptibility, whereas 316 and "L" grades (e.g., 304L) can be considered resistant, particularly at temperatures below the 140°F threshold. Therefore the Type 304 stainless steel Spent Fuel Storage Racks are considered to be susceptible to SCC.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-91	Stainless steel and steel with stainless steel cladding piping, piping components, and piping elements exposed to treated borated water	Loss of material due to pitting and crevice corrosion	Water Chemistry	No	Consistent with NUREG-1801. The aging effect is managed by the Water Chemistry Program.
3.3.1-92	Galvanized steel piping, piping components, and piping elements exposed to air – indoor uncontrolled	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.3.1-93	Glass piping elements exposed to air, air – indoor uncontrolled (external), fuel oil, lubricating oil, raw water, treated water, and treated borated water	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.3.1-94	Stainless steel and nickel alloy piping, piping components, and piping elements exposed to air – indoor uncontrolled (external)	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.3.1-95	Steel and aluminum piping, piping components, and piping elements exposed to air – indoor controlled (external)	None	None	NA - No AEM or AMP	This item is not applicable to CR-3.
3.3.1-96	Steel and stainless steel piping, piping components, and piping elements in concrete	None	None	NA - No AEM or AMP	This item is not applicable to CR-3.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-97	Steel, stainless steel, aluminum, and copper alloy piping, piping components, and piping elements exposed to gas	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.3.1-98	Steel, stainless steel, and copper alloy piping, piping components, and piping elements exposed to dried air	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.3.1-99	Stainless steel and copper alloy <15% Zn piping, piping components, and piping elements exposed to air with borated water leakage	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.

TABLE 3.3.2-1 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AIR HANDLING VENTILATION AND COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Containment isolation piping and components	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Ducting and components	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A

TABLE 3.3.2-1 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AIR HANDLING VENTILATION AND COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting and components (continued)	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F1-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Ducting Closure Bolting	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-7 (A-105)	3.3.1-55	A
EFP-3 Diesel Combustion Air Intake Filter Housing	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-2 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F4-1 (A-10)	3.3.1-56	A

TABLE 3.3.2-1 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AIR HANDLING VENTILATION AND COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
EFP-3 Diesel Engine Exhaust Expansion Joints and Silencers	M-1	Carbon or Low Alloy Steel	Diesel Exhaust (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Cumulative Fatigue Damage due to Fatigue	TLAA			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
		Stainless Steel	Diesel Exhaust (Inside)	Cracking due to SCC Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Cumulative Fatigue Damage due to Fatigue	TLAA			J
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-1 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AIR HANDLING VENTILATION AND COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fan Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F1-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Piping, piping components, piping elements, and tanks	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-2 (EP-3)	3.2.1-50	C, 307
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A

TABLE 3.3.2-1 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AIR HANDLING VENTILATION AND COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Carbon or Low Alloy Steel	Dried Air (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 319
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A

TABLE 3.3.2-1 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AIR HANDLING VENTILATION AND COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Copper and Copper Alloys	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 319
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J, 319
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C
		Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 319
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-2 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING RECIRCULATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Containment isolation piping and components	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.F3-20 (A-25)	3.3.1-47	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.F3-15 (AP-12)	3.3.1-51	B
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.F3-17 (AP-43)	3.3.1-84	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A

TABLE 3.3.2-2 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING RECIRCULATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting and components	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Ducting Closure Bolting	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F3-4 (A-105)	3.3.1-55	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
Flexible Connections	M-1	Elastomers	Air - Indoor Uncontrolled (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-6 (A-18)	3.3.1-34	E
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring	VII.F3-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	External Surfaces Monitoring	VII.F3-5 (A-73)	3.3.1-34	E

TABLE 3.3.2-2 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING RECIRCULATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 319
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Reactor Building Fan Assembly Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A

TABLE 3.3.2-2 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING RECIRCULATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Building Fan Assembly Housings (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F3-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Reactor Building Fan Assembly Cooling Coil Components	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	C
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F3-2 (A-10)	3.3.1-56	C
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-2 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING RECIRCULATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Building Fan Assembly Cooling Coil Components (continued)	M-1	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.F3-8 (AP-34)	3.3.1-51	B
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.F3-17 (AP-43)	3.3.1-84	D
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
Reactor Building Fan Assembly Cooling Coil Tubes	M-5	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.F3-12 (AP-80)	3.3.1-52	B
			Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
Reactor Building Fan Assembly Filter Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A

TABLE 3.3.2-2 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING RECIRCULATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Building Fan Assembly Filter Housings (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F3-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Reactor Building Fan Assembly Motor Cooler Components	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	C
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F3-2 (A-10)	3.3.1-56	C
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-2 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING RECIRCULATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Building Fan Assembly Motor Cooler Components (continued)	M-1	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.F3-8 (AP-34)	3.3.1-51	B
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.F3-17 (AP-43)	3.3.1-84	D
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
Reactor Building Fan Assembly Motor Cooler Tubes	M-5	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.F3-12 (AP-80)	3.3.1-52	B
			Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J

TABLE 3.3.2-2 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING RECIRCULATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Building Fan Assembly Fan Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F3-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-3 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING MISCELLANEOUS VENTILATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting and components	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F3-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-1 (A-09)	3.3.1-27	E
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Ducting Closure Bolting	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F3-4 (A-105)	3.3.1-55	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
Flexible Connections	M-1	Elastomers	Air - Indoor Uncontrolled (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-6 (A-18)	3.3.1-34	E

TABLE 3.3.2-3 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING MISCELLANEOUS VENTILATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flexible Connections (continued)	M-1	Elastomers	Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring	VII.F3-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	External Surfaces Monitoring	VII.F3-5 (A-73)	3.3.1-34	E
Non-safety related cooling coil housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	C
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F3-2 (A-10)	3.3.1-56	C
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-3 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING MISCELLANEOUS VENTILATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F3-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper and Copper Alloys	Air - Indoor Uncontrolled (Inside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-3 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING MISCELLANEOUS VENTILATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Building Fan Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F3-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-1 (A-09)	3.3.1-27	E
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

TABLE 3.3.2-4 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING PURGE SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Air Handling Unit Housings	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F3-2 (A-10)	3.3.1-56	A
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Containment isolation piping and components	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F3-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-4 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING PURGE SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting and components	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F3-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Galvanized Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F3-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Ducting Closure Bolting	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F3-4 (A-105)	3.3.1-55	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-4 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING PURGE SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flexible Connections	M-1	Elastomers	Air - Indoor Uncontrolled (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-6 (A-18)	3.3.1-34	E
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring	VII.F3-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	External Surfaces Monitoring	VII.F3-5 (A-73)	3.3.1-34	E
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-2 (EP-3)	3.2.1-50	C, 307
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A
		Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A

TABLE 3.3.2-4 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING PURGE SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Dried Air (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper and Copper Alloys	Air - Indoor Uncontrolled (Inside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C
			Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C, 307
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-4 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING PURGE SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Building Purge Filter Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F3-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Reactor Building Purge Fan Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F3-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Screens	M-2	Stainless Steel	Air - Indoor Uncontrolled (Outside)	None	None	VII.J-16 (AP-18)	3.3.1-99	A, 304

TABLE 3.3.2-5 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY BUILDING SUPPLY SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Air Handling Unit Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Auxiliary Building Fan Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-5 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY BUILDING SUPPLY SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting and components	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Galvanized Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Ducting Closure Bolting	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-4 (A-105)	3.3.1-55	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A

TABLE 3.3.2-5 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY BUILDING SUPPLY SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Filter Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Flexible Connections	M-1	Elastomers	Air - Indoor Uncontrolled (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-6 (A-18)	3.3.1-34	E
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring	VII.F2-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	External Surfaces Monitoring	VII.F2-5 (A-73)	3.3.1-34	E

TABLE 3.3.2-5 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY BUILDING SUPPLY SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A
		Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-6 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FUEL HANDLING AREA SUPPLY SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Air Handling Unit Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Ducting and components	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Galvanized Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A

TABLE 3.3.2-6 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FUEL HANDLING AREA SUPPLY SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting and components (continued)	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Ducting Closure Bolting	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-4 (A-105)	3.3.1-55	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
Filter Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-6 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FUEL HANDLING AREA SUPPLY SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flexible Connections	M-1	Elastomers	Air - Indoor Uncontrolled (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-6 (A-18)	3.3.1-34	E
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring	VII.F2-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	External Surfaces Monitoring	VII.F2-5 (A-73)	3.3.1-34	E
Fuel Handling Area Fan Housing	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-6 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FUEL HANDLING AREA SUPPLY SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A
		Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-7 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DECAY HEAT CLOSED CYCLE PUMP COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Air Handling Unit Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Decay Heat Closed Cycle Pump Air Supply Fan Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-7 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DECAY HEAT CLOSED CYCLE PUMP COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Decay Heat Closed Cycle Pump Air Supply Cooling Coil Tubes	M-5	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.F2-10 (AP-80)	3.3.1-52	B
			Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
Decay Heat Closed Cycle Pump Air Supply Cooling Coil Components	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	C
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.F2-13 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.F2-15 (AP-43)	3.3.1-84	D

TABLE 3.3.2-7 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DECAY HEAT CLOSED CYCLE PUMP COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Decay Heat Closed Cycle Pump Air Supply Cooling Coil Components (continued)	M-1	Copper and Copper Alloys	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
		Galvanized Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	C
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Ducting and components	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-7 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DECAY HEAT CLOSED CYCLE PUMP COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting Closure Bolting	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-4 (A-105)	3.3.1-55	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
Filter Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Flexible Connections	M-1	Elastomers	Air - Indoor Uncontrolled (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-6 (A-18)	3.3.1-34	E
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring	VII.F2-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	External Surfaces Monitoring	VII.F2-5 (A-73)	3.3.1-34	E

TABLE 3.3.2-7 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DECAY HEAT CLOSED CYCLE PUMP COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A
		Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Screens	M-2	Galvanized Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-8 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SPENT FUEL COOLANT PUMP COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Air Handling Unit Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Ducting and components	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-8 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SPENT FUEL COOLANT PUMP COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting Closure Bolting	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-4 (A-105)	3.3.1-55	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
Filter Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Flexible Connections	M-1	Elastomers	Air - Indoor Uncontrolled (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-6 (A-18)	3.3.1-34	E
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring	VII.F2-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	External Surfaces Monitoring	VII.F2-5 (A-73)	3.3.1-34	E

TABLE 3.3.2-8 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SPENT FUEL COOLANT PUMP COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A
		Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-98	A
		Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Spent Fuel Coolant Pump Air Supply Fan Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-8 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SPENT FUEL COOLANT PUMP COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Spent Fuel Coolant Pump Air Supply Cooling Coil Tubes	M-5	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.F2-10 (AP-80)	3.3.1-52	B
			Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
Spent Fuel Coolant Pump Air Supply Cooling Coil Components	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	C
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.F2-13 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.F2-15 (AP-43)	3.3.1-84	D

TABLE 3.3.2-8 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SPENT FUEL COOLANT PUMP COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Spent Fuel Coolant Pump Air Supply Cooling Coil Components (continued)	M-1	Copper and Copper Alloys	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
		Galvanized Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	C
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-9 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SPENT FUEL PIT SUPPLY SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting and components	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Ducting Closure Bolting	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-4 (A-105)	3.3.1-55	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
Flexible Connections	M-1	Elastomers	Air - Indoor Uncontrolled (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-6 (A-18)	3.3.1-34	E
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring	VII.F2-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	External Surfaces Monitoring	VII.F2-5 (A-73)	3.3.1-34	E

TABLE 3.3.2-9 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SPENT FUEL PIT SUPPLY SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A
		Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Spent Fuel Pit Supply Fan Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-10 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION– AUXILIARY BUILDING EXHAUST SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Auxiliary Building Exhaust Filter Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Auxiliary Building Fan Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F.2-1 (A-09)	3.3.1-27	E
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-10 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION– AUXILIARY BUILDING EXHAUST SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting and components	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F.2-1 (A-09)	3.3.1-27	E
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Ducting Closure Bolting	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-4 (A-105)	3.3.1-55	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A

TABLE 3.3.2-10 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION– AUXILIARY BUILDING EXHAUST SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flexible Connections	M-1	Elastomers	Air - Indoor Uncontrolled (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-6 (A-18)	3.3.1-34	E
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring	VII.F2-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	External Surfaces Monitoring	VII.F2-5 (A-73)	3.3.1-34	E

TABLE 3.3.2-10 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION– AUXILIARY BUILDING EXHAUST SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A
		Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-11 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL COMPLEX VENTILATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Control Complex Emergency Fan Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F1-2 (A-10)	3.3.1-56	A
Control Complex Emergency Filter Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F1-2 (A-10)	3.3.1-56	A
Control Complex Normal Duty Supply Air Handling Units	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F1-2 (A-10)	3.3.1-56	A

TABLE 3.3.2-11 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL COMPLEX VENTILATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A, 308
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Control Complex Normal and Emergency Cooling Coil Tubes	M-5	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.F1-12 (AP-80)	3.3.1-52	B
			Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
Control Complex Normal and Emergency Cooling Coil Components	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-3 (A-08)	3.3.1-72	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F1-2 (A-10)	3.3.1-56	C

TABLE 3.3.2-11 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL COMPLEX VENTILATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Control Complex Normal and Emergency Cooling Coil Components (continued)	M-1	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.F1-8 (AP-34)	3.3.1-51	B
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.F1-17 (AP-43)	3.3.1-84	D
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
		Galvanized Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-3 (A-08)	3.3.1-72	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F1-2 (A-10)	3.3.1-56	C

TABLE 3.3.2-11 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL COMPLEX VENTILATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Control Complex Normal Duty Fan Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F1-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A, 308
Ducting and components	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F1-2 (A-10)	3.3.1-56	A
		Copper and Copper Alloys	Dry Gas (Inside)	None	None	VII.J-4 (AP-9)	3.3.1-97	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C

TABLE 3.3.2-11 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL COMPLEX VENTILATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting and components (continued)	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F1-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A, 308
		PVC or Thermo-plastics	Air - Indoor Uncontrolled (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring			J
		Stainless Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-1 (A-09)	3.3.1-27	E
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-11 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL COMPLEX VENTILATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting Closure Bolting	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F1-4 (A-105)	3.3.1-55	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A, 308
Flexible Connections	M-1	Elastomers	Air - Indoor Uncontrolled (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-6 (A-18)	3.3.1-34	E
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Wear	External Surfaces Monitoring	VII.F1-5 (A-73)	3.3.1-34	E
				Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring	VII.F1-7 (A-17)	3.3.1-11	E

TABLE 3.3.2-11 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL COMPLEX VENTILATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks	M-1	Aluminum or Aluminum Alloys	Air - Indoor Uncontrolled (Inside)	None	None	V.F-2 (EP-3)	3.2.1-50	C
			Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-2 (EP-3)	3.2.1-50	C, 307
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A, 308
		Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-3 (A-08)	3.3.1-72	A
			Dried Air (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Dry Gas (Inside)	None	None	VII.J-23 (AP-6)	3.3.1-97	A
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-3 (A-08)	3.3.1-72	A

TABLE 3.3.2-11 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL COMPLEX VENTILATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F1-2 (A-10)	3.3.1-56	A
		Copper and Copper Alloys	Air - Indoor Uncontrolled (Inside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C
			Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Dry Gas (Inside)	None	None	VII.J-4 (AP-9)	3.3.1-97	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C, 307
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A, 308
		Glass	Dry Gas (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A

TABLE 3.3.2-11 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL COMPLEX VENTILATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-12 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY DIESEL GENERATOR AIR HANDLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting and components	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-2 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F4-1 (A-10)	3.3.1-56	A
Ducting Closure Bolting	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F4-3 (A-105)	3.3.1-55	A
EDG Air Handling Fan Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-2 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F4-1 (A-10)	3.3.1-56	A

TABLE 3.3.2-12 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY DIESEL GENERATOR AIR HANDLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
EDG Air Handling Filter Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-2 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F4-1 (A-10)	3.3.1-56	A
Flexible Connections	M-1	Elastomers	Air - Indoor Uncontrolled (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-6 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-5 (A-18)	3.3.1-34	E
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring	VII.F4-6 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	External Surfaces Monitoring	VII.F4-4 (A-73)	3.3.1-34	E

TABLE 3.3.2-12 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY DIESEL GENERATOR AIR HANDLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-2 (EP-3)	3.2.1-50	C
		Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C
		Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Screens	M-2	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A

TABLE 3.3.2-13 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MISCELLANEOUS AREA HVAC SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting and components	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
		Galvanized Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A, 309
Ducting Closure Bolting	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-4 (A-105)	3.3.1-55	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A, 309

TABLE 3.3.2-13 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MISCELLANEOUS AREA HVAC SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fan Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A, 309
Fire Service Pump House Ventilation Filter Housing	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A

TABLE 3.3.2-13 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MISCELLANEOUS AREA HVAC SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flexible Connections	M-1	Elastomers	Air - Indoor Uncontrolled (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-6 (A-18)	3.3.1-34	E
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring	VII.F2-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	External Surfaces Monitoring	VII.F2-5 (A-73)	3.3.1-34	E
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-2 (EP-3)	3.2.1-50	C
		Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C

TABLE 3.3.2-13 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MISCELLANEOUS AREA HVAC SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Screens	M-2	Galvanized Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-14 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – TURBINE BUILDING VENTILATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting and components	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
Ducting Closure Bolting	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-4 (A-105)	3.3.1-55	A

TABLE 3.3.2-15 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – PENETRATION COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Air Handling Unit Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Ducting and components	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A

TABLE 3.3.2-15 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – PENETRATION COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting and components (continued)	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Ducting Closure Bolting	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-4 (A-105)	3.3.1-55	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
Fan Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A

TABLE 3.3.2-15 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – PENETRATION COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Filter Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-2 (EP-3)	3.2.1-50	C, 307
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A
		Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-15 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – PENETRATION COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C
		Gray Cast Iron	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-15 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – PENETRATION COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Building Penetration Cooling Coil Components	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	C
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.F2-13 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.F2-15 (AP-43)	3.3.1-84	D
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J

TABLE 3.3.2-15 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – PENETRATION COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Building Penetration Cooling Coil Components (continued)	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	C
Reactor Building Penetration Cooling Coils	M-5	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.F2-10 (AP-80)	3.3.1-52	B
			Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J

TABLE 3.3.2-16 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY FEEDWATER INITIATION AND CONTROL ROOM HVAC SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Air Handling Unit Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F1-2 (A-10)	3.3.1-56	A
		Stainless Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-1 (A-09)	3.3.1-27	E
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-1 (A-09)		H
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A

TABLE 3.3.2-16 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY FEEDWATER INITIATION AND CONTROL ROOM HVAC SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting and components	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F1-2 (A-10)	3.3.1-56	A
Ducting Closure Bolting	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F1-4 (A-105)	3.3.1-55	A
EFIC Room HVAC Cooling Coil Components	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-3 (A-08)	3.3.1-72	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F1-2 (A-10)	3.3.1-56	C

TABLE 3.3.2-16 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY FEEDWATER INITIATION AND CONTROL ROOM HVAC SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
EFIC Room HVAC Cooling Coil Components (continued)	M-1	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.F1-8 (AP-34)	3.3.1-51	B
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.F1-17 (AP-43)	3.3.1-84	D
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
		Galvanized Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-3 (A-08)	3.3.1-72	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F1-2 (A-10)	3.3.1-56	C

TABLE 3.3.2-16 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY FEEDWATER INITIATION AND CONTROL ROOM HVAC SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
EFIC Room HVAC Cooling Coil Tubes	M-5	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.F1-12 (AP-80)	3.3.1-52	B
			Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
EFIC Room HVAC Fan Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F1-2 (A-10)	3.3.1-56	A
EFIC Room HVAC Filter Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F1-2 (A-10)	3.3.1-56	A

TABLE 3.3.2-16 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY FEEDWATER INITIATION AND CONTROL ROOM HVAC SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flexible Connections	M-1	Elastomers	Air - Indoor Uncontrolled (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-6 (A-18)	3.3.1-34	E
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Wear	External Surfaces Monitoring	VII.F1-5 (A-73)	3.3.1-34	E
				Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring	VII.F1-7 (A-17)	3.3.1-11	E
Piping, piping components, and piping elements	M-1	Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-17 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – APPENDIX R CONTROL COMPLEX DEDICATED COOLING SUPPLY SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Appendix R Control Complex Dedicated Room Cooler Components	M-1	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.F1-8 (AP-34)	3.3.1-51	B
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.F1-17 (AP-43)	3.3.1-84	D
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
		Galvanized Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-3 (A-08)	3.3.1-72	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F1-2 (A-10)	3.3.1-56	C

TABLE 3.3.2-17 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – APPENDIX R CONTROL COMPLEX DEDICATED COOLING SUPPLY SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Appendix R Control Complex Dedicated Room Cooler Tubes	M-5	Aluminum or Aluminum Alloys	Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.F1-12 (AP-80)	3.3.1-52	B
			Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A

TABLE 3.3.2-18 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY FEEDWATER PUMP BUILDING VENTILATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
			Air - Outdoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-1 (AP-28)	3.3.1-43	A
Ducting and components	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-2 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F4-1 (A-10)	3.3.1-56	A
		Stainless Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-1 (A-09)	3.3.1-27	E
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-18 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY FEEDWATER PUMP BUILDING VENTILATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting Closure Bolting	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F4-3 (A-105)	3.3.1-55	A
EFP-3 Diesel Engine Exhaust; Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air - Outdoor (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VIII.B1-6 (SP-59)	3.4.1-30	C
			Diesel Exhaust (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Cumulative Fatigue Damage due to Fatigue	TLAA			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
			Air - Outdoor (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-9 (A-78)	3.3.1-58	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.I-9 (A-78)		H

TABLE 3.3.2-18 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY FEEDWATER PUMP BUILDING VENTILATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Emergency Feedwater Pump Building Ventilation Fan Housings	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-2 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F4-1 (A-10)	3.3.1-56	A
Emergency Feedwater Pump Building Ventilation Filter Housings	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-2 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F4-1 (A-10)	3.3.1-56	A
Expansion Joints	M-1	Carbon or Low Alloy Steel	Diesel Exhaust (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Cumulative Fatigue Damage due to Fatigue	TLAA			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A

TABLE 3.3.2-18 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY FEEDWATER PUMP BUILDING VENTILATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Expansion Joints (continued)	M-1	Stainless Steel	Diesel Exhaust (Inside)	Cracking due to SCC Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Cumulative Fatigue Damage due to Fatigue	TLAA			J
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Flexible Connections	M-1	Elastomers	Air - Indoor Uncontrolled (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-6 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-5 (A-18)	3.3.1-34	E
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring	VII.F4-6 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	External Surfaces Monitoring	VII.F4-4 (A-73)	3.3.1-34	E

TABLE 3.3.2-18 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY FEEDWATER PUMP BUILDING VENTILATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-2 (A-08)	3.3.1-72	A
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-2 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F4-1 (A-10)	3.3.1-56	A
		Copper and Copper Alloys	Dry Gas (Inside)	None	None	VII.J-4 (AP-9)	3.3.1-97	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C
Screens	M-2	Galvanized Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F4-1 (A-10)	3.3.1-56	A

TABLE 3.3.2-19 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CHEMICAL ADDITION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Containment isolation piping and components	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping, piping components, piping elements, and tanks	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A

TABLE 3.3.2-19 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CHEMICAL ADDITION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-3 (EP-10)	3.2.1-53	C, 307
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Glass	Treated Water (Inside)	None	None	VII.J-13 (AP-51)	3.3.1-93	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
		Stainless Steel	Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-20 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – LIQUID SAMPLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Containment isolation piping and components	M-1	Stainless Steel	Treated Water (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	VII.E1-16 (A-57)	3.3.1-02	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping Insulation	M-6	Insulation	Air - Indoor Uncontrolled (Outside)	None	None			J

TABLE 3.3.2-20 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – LIQUID SAMPLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-1 (SP-24)	3.4.1-15	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A
		Fiber Glass or Fiber Reinforced Plastic	Dry Gas (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring			J
		Glass	Treated Water (Inside)	None	None	VII.J-13 (AP-51)	3.3.1-93	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A

TABLE 3.3.2-20 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – LIQUID SAMPLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Dry Gas (Inside)	None	None	VII.J-19 (AP-22)	3.3.1-97	A
			Raw Water (Inside)	Cracking due to SCC Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Treated Water (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	VII.E1-16 (A-57)	3.3.1-02	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-20 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – LIQUID SAMPLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer and Steam Generator Sample Cooler Components	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Treated Water (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	VII.E1-16 (A-57)	3.3.1-02	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	C
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	C
			Closed Cycle Cooling Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	D
				Cracking due to SCC	Closed-Cycle Cooling Water System	VII.C2-11 (AP-60)	3.3.1-46	D

TABLE 3.3.2-20 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – LIQUID SAMPLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer and Steam Generator Sample Cooler Tubes	M-5	Stainless Steel	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Water Chemistry and One-Time Inspection	V.A-16 (EP-34)	3.2.1-10	C
			Closed Cycle Cooling Water (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-3 (AP-63)	3.3.1-52	B

TABLE 3.3.2-21 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION - POST ACCIDENT LIQUID SAMPLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Containment Isolation Piping and Components	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	C
				Cumulative Fatigue Damage due to Fatigue	TLAA	VII.E1-16 (A-57)	3.3.1-02	A
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-21 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION - POST ACCIDENT LIQUID SAMPLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
PASS Sample Cooler Components	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.E1-6 (A-63)	3.3.1-48	B
		Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Nickel Base Alloys	Treated Water (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Cracking due to SCC Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry			J
			Closed Cycle Cooling Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System			J

TABLE 3.3.2-21 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION - POST ACCIDENT LIQUID SAMPLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
PASS Sample Cooler Components (continued)	M-1	Stainless Steel	Raw Water (Inside)	Cracking due to SCC Loss of Material due to Crevice Corrosion Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
PASS Sample Cooler Tubes	M-5	Nickel Base Alloys	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Water Chemistry			J
			Closed Cycle Cooling Water (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System			J

TABLE 3.3.2-21 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION - POST ACCIDENT LIQUID SAMPLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A
		Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Glass	Dried Air (Inside)	None	None	VII.J-7 (AP-48)	3.3.1-93	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A

TABLE 3.3.2-21 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION - POST ACCIDENT LIQUID SAMPLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	PVC or Thermo-plastics	Treated Water (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring			J
		Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Dry Gas (Inside)	None	None	VII.J-19 (AP-22)	3.3.1-97	A
			Treated Water (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	VII.E1-16 (A-57)	3.3.1-02	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-22 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL COMPLEX CHILLED WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Control Complex Chilled Water Chemical Addition Tank	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
Control Complex Chilled Water Expansion Tank	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Dry Gas (Inside)	None	None	VII.J-23 (AP-6)	3.3.1-97	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
Control Complex Chilled Water Pumps	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A

TABLE 3.3.2-22 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL COMPLEX CHILLED WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Control Complex Chiller Components	M-1	Carbon or Low Alloy Steel	Dry Gas (Inside)	None	None	VII.J-23 (AP-6)	3.3.1-97	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (A-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	D
			Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.C2-5 (AP-47)	3.3.1-26	C, 317
			Dry Gas (Outside)	None	None	VII.J-4 (AP-9)	3.3.1-97	C
		Glass	Dry Gas (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A

TABLE 3.3.2-22 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL COMPLEX CHILLED WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Control Complex Chiller Condenser Tubes	M-5	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	B
			Dry Gas (Outside)	None	None	VII.J-4 (AP-9)	3.3.1-97	C
Control Complex Chiller Cooler Tubes	M-5	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	B
			Dry Gas (Outside)	None	None	VII.J-4 (AP-9)	3.3.1-97	C
Control Complex Chiller Lube Oil Pumps	M-1	Carbon or Low Alloy Steel	Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.C2-13 (AP-30)	3.3.1-14	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
Control Complex Chiller Oil Cooler Tubes	M-5	Copper and Copper Alloys	Lubricating Oil (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Lubricating Oil Analysis and One-Time Inspection	VIII.G-8 (SP-53)	3.4.1-10	C
			Dry Gas (Outside)	None	None	VII.J-4 (AP-9)	3.3.1-97	C

TABLE 3.3.2-22 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL COMPLEX CHILLED WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Control Complex Chiller Rupture Disk	M-1	Carbon or Low Alloy Steel	Dry Gas (Inside)	None	None	VII.J-23 (AP-6)	3.3.1-97	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Expansion Joints	M-1	Elastomers	Closed Cycle Cooling Water (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation Loss of Material due to Wear	External Surfaces Monitoring			J
Piping Insulation	M-6	Insulation	Air - Indoor Uncontrolled (Outside)	None	None			J

TABLE 3.3.2-22 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL COMPLEX CHILLED WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-2 (EP-3)	3.2.1-50	C
		Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	C
			Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
				Loss of Material due to Galvanic Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	D
			Dry Gas (Inside)	None	None	VII.J-23 (AP-6)	3.3.1-97	A
			Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.C2-13 (AP-30)	3.3.1-14	A

TABLE 3.3.2-22 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL COMPLEX CHILLED WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	B
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	B
			Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 316
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J, 316
				None	None	VIII.I-2 (SP-6)	3.4.1-41	C

TABLE 3.3.2-22 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL COMPLEX CHILLED WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Glass	Closed Cycle Cooling Water (Inside)	None	None	VII.J-13 (AP-51)	3.3.1-93	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
		Gray Cast Iron	Closed Cycle Cooling Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-8 (A-50)	3.3.1-85	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
		PVC or Thermo-plastics	Closed Cycle Cooling Water (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring			J

TABLE 3.3.2-22 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL COMPLEX CHILLED WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
			Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-29 (SP-16)	3.4.1-16	C, 313
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-23 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – APPENDIX R CHILLED WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Appendix R Control Complex Chiller Air Cooled Condenser Components	M-1	Aluminum or Aluminum Alloys	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
				Cracking due to SCC	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
		Copper and Copper Alloys	Dry Gas (Inside)	None	None	VII.J-4 (AP-9)	3.3.1-97	C
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
		Galvanized Steel	Air - Outdoor (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-2 (A-08)	3.3.1-72	C
			Air - Outdoor (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-9 (A-78)	3.3.1-58	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.I-9 (A-78)		H

TABLE 3.3.2-23 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – APPENDIX R CHILLED WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Appendix R Control Complex Chiller Air Cooled Condenser Tubes	M-5	Aluminum or Aluminum Alloys	Air - Outdoor (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	External Surfaces Monitoring			J
		Copper and Copper Alloys	Dry Gas (Inside)	None	None	VII.J-4 (AP-9)	3.3.1-97	C
			Air - Outdoor (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	External Surfaces Monitoring			J
Appendix R Control Complex Chiller Cooler Components	M-1	Carbon or Low Alloy Steel	Dry Gas (Inside)	None	None	VII.J-23 (AP-6)	3.3.1-97	C
			Air - Outdoor (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-9 (A-78)	3.3.1-58	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.I-9 (A-78)		H
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.F1-17 (AP-43)	3.3.1-84	D
			Dry Gas (Outside)	None	None	VII.J-4 (AP-9)	3.3.1-97	C

TABLE 3.3.2-23 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – APPENDIX R CHILLED WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Appendix R Control Complex Chiller Cooler Components (continued)	M-1	Galvanized Steel	Dry Gas (Inside)	None	None	VII.J-23 (AP-6)	3.3.1-97	C
			Air - Outdoor (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-9 (A-78)	3.3.1-58	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.I-9 (A-78)		H
Appendix R Control Complex Chiller Cooler Tubes	M-5	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	B
			Dry Gas (Outside)	None	None	VII.J-4 (AP-9)	3.3.1-97	C
Appendix R Control Complex Chilled Water Pump	M-1	Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-23 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – APPENDIX R CHILLED WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Appendix R Control Complex Chilled Water Surge Tank	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
				Loss of Material due to Galvanic Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	D
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
			Air - Outdoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-1 (AP-28)	3.3.1-43	A

TABLE 3.3.2-23 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – APPENDIX R CHILLED WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Expansion Joints	M-1	Elastomers	Closed Cycle Cooling Water (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation Loss of Material due to Wear	External Surfaces Monitoring			J
			Air - Outdoor (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring			J
Flow restricting elements	M-1	Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
	M-3	Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B

TABLE 3.3.2-23 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – APPENDIX R CHILLED WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping Insulation	M-6	Insulation	Air - Indoor Uncontrolled (Outside)	None	None			J
			Air - Outdoor (Outside)	None	None			J
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	B
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	B
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C

TABLE 3.3.2-23 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – APPENDIX R CHILLED WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Glass	Closed Cycle Cooling Water (Inside)	None	None	VII.J-13 (AP-51)	3.3.1-93	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
		Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J

TABLE 3.3.2-24 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – INDUSTRIAL COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Containment isolation piping and components	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	B
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	B
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-5 (AP-11)	3.3.1-99	A, 314

TABLE 3.3.2-24 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – INDUSTRIAL COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment isolation piping and components (continued)	M-1	Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping Insulation	M-6	Insulation	Air - Indoor Uncontrolled (Outside)	None	None			J
Piping, piping components, piping elements, and tanks	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Dried Air (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 310

TABLE 3.3.2-24 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – INDUSTRIAL COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	B
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	B
			Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-3 (EP-10)	3.2.1-53	C, 312
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A

TABLE 3.3.2-24 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – INDUSTRIAL COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Elastomers	Closed Cycle Cooling Water (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation Loss of Material due to Wear	External Surfaces Monitoring			J
		Glass	Closed Cycle Cooling Water (Inside)	None	None	VII.J-13 (AP-51)	3.3.1-93	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
		Gray Cast Iron	Closed Cycle Cooling Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-8 (A-50)	3.3.1-85	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A

TABLE 3.3.2-24 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – INDUSTRIAL COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 310
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 310

TABLE 3.3.2-25 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CIRCULATING WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Circulating Water Expansion Joints	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
		Elastomers	Raw Water (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation Loss of Material due to Wear	External Surfaces Monitoring			J
Circulating Water Pumps	M-1	Copper and Copper Alloys	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C1-10 (A-47)	3.3.1-84	D
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J

TABLE 3.3.2-25 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CIRCULATING WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Piping, piping components, piping elements, and tanks	M-1	Carbon or Low Alloy Steel	Dried Air (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A

TABLE 3.3.2-25 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CIRCULATING WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Copper and Copper Alloys	Raw Water (Inside)	Cracking due to SCC Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C1-10 (A-47)	3.3.1-84	D
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
		Glass	Raw Water (Inside)	None	None	VII.J-11 (AP-50)	3.3.1-93	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A

TABLE 3.3.2-25 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CIRCULATING WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Reinforced Concrete	Raw Water (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms Loss of Material due to Various Degradation Mechanisms	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Soil (Outside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms Loss of Material due to Various Degradation Mechanisms	Structures Monitoring Program			J, 303

TABLE 3.3.2-25 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CIRCULATING WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Stainless Steel	Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J

TABLE 3.3.2-26 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EFP-3 DIESEL AIR STARTING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
EFP Starting Air Receivers	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Flow Blockage due to Fouling	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 318
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-21 (A-23)	3.3.1-71	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A

TABLE 3.3.2-26 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EFP-3 DIESEL AIR STARTING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Flow Blockage due to Fouling	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 318
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-21 (A-23)	3.3.1-71	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
		Copper and Copper Alloys	Air - Indoor Uncontrolled (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 318
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C

TABLE 3.3.2-26 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EFP-3 DIESEL AIR STARTING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Air - Indoor Uncontrolled (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 318
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
System strainers	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Flow Blockage due to Fouling	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 318
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-21 (A-23)	3.3.1-71	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
	M-2	Stainless Steel	Air - Indoor Uncontrolled (Outside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 318

TABLE 3.3.2-27 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION - DECAY HEAT CLOSED CYCLE COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Decay Heat Closed Cycle Surge Tanks	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Dry Gas (Inside)	None	None	VII.J-23 (AP-6)	3.3.1-97	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION - DECAY HEAT CLOSED CYCLE COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Decay Heat Closed Cycle Cooling Water Heat Exchanger Components	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	D

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION - DECAY HEAT CLOSED CYCLE COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Decay Heat Closed Cycle Cooling Water Heat Exchanger Components (continued)	M-1	Copper and Copper Alloys	Open Cycle Cooling Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-3 (A-65)	3.3.1-82	A
			Closed Cycle Cooling Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	D
		Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	D
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION - DECAY HEAT CLOSED CYCLE COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Decay Heat Closed Cycle Cooling Water Heat Exchanger Tubes	M-5	Copper and Copper Alloys	Open Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Open-Cycle Cooling Water System	VII.C1-6 (A-72)	3.3.1-83	A
			Closed Cycle Cooling Water (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	B
Decay Heat Closed Cycle Cooling Water Pumps	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION - DECAY HEAT CLOSED CYCLE COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Makeup Pump Gearbox Cooler Components	M-1	Carbon or Low Alloy Steel	Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.C2-13 (AP-30)	3.3.1-14	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	D
			Lubricating Oil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.C2-5 (AP-47)	3.3.1-26	C

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION - DECAY HEAT CLOSED CYCLE COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Makeup Pump Gearbox Cooler Components (continued)	M-1	Gray Cast Iron	Closed Cycle Cooling Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-8 (A-50)	3.3.1-85	D
				Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Makeup Pump Gearbox Cooler Tubes	M-5	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	B
			Lubricating Oil (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Lubricating Oil Analysis and One-Time Inspection	VIII.G-8 (SP-53)	3.4.1-10	C

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION - DECAY HEAT CLOSED CYCLE COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Makeup Pump Lube Oil Cooler Components	M-1	Carbon or Low Alloy Steel	Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.C2-13 (AP-30)	3.3.1-14	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	D
			Lubricating Oil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.C2-5 (AP-47)	3.3.1-26	C

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION - DECAY HEAT CLOSED CYCLE COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Makeup Pump Lube Oil Cooler Components (continued)	M-1	Gray Cast Iron	Closed Cycle Cooling Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-8 (A-50)	3.3.1-85	D
				Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Makeup Pump Lube Oil Cooler Tubes	M-5	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	B
			Lubricating Oil (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Lubricating Oil Analysis and One-Time Inspection	VIII.G-8 (SP-53)	3.4.1-10	C

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION - DECAY HEAT CLOSED CYCLE COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Motor Cooler Components	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	C
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	D

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION - DECAY HEAT CLOSED CYCLE COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Motor Cooler Components (continued)	M-1	Copper and Copper Alloys	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
			Raw Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
Motor Cooler Tubes	M-5	Aluminum or Aluminum Alloys	Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	B
			Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION - DECAY HEAT CLOSED CYCLE COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping Insulation	M-6	Insulation	Air - Indoor Uncontrolled (Outside)	None	None			J
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A
		Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Dry Gas (Inside)	None	None	VII.J-23 (AP-6)	3.3.1-97	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION - DECAY HEAT CLOSED CYCLE COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Glass	Closed Cycle Cooling Water (Inside)	None	None	VII.J-13 (AP-51)	3.3.1-93	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
		Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
			Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-28 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FUEL OIL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
			Soil (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity			J
				Loss of Material due to Galvanic Corrosion	Buried Piping and Tanks Inspection			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Buried Piping and Tanks Inspection	VII.H1-9 (A-01)	3.3.1-19	C

TABLE 3.3.2-28 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FUEL OIL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fuel Oil Filter Housings	M-1	Carbon or Low Alloy Steel	Fuel Oil (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H1-10 (A-30)	3.3.1-20	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
Fuel Oil Pumps	M-1	Carbon or Low Alloy Steel	Fuel Oil (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H1-10 (A-30)	3.3.1-20	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A

TABLE 3.3.2-28 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FUEL OIL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fuel Oil Pumps (continued)	M-1	Gray Cast Iron	Fuel Oil (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
				Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H1-10 (A-30)	3.3.1-20	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
Fuel Oil Storage Tanks	M-1	Carbon or Low Alloy Steel	Fuel Oil (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H1-10 (A-30)	3.3.1-20	B

TABLE 3.3.2-28 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FUEL OIL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fuel Oil Storage Tanks (continued)	M-1	Carbon or Low Alloy Steel	Soil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Buried Piping and Tanks Inspection	VII.H1-9 (A-01)	3.3.1-19	A
				Loss of Material due to Galvanic Corrosion	Buried Piping and Tanks Inspection	VII.H1-9 (A-01)		H
Fuel Oil Tanks	M-1	Carbon or Low Alloy Steel	Fuel Oil (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H1-10 (A-30)	3.3.1-20	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A

TABLE 3.3.2-28 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FUEL OIL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks	M-1	Aluminum or Aluminum Alloys	Fuel Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H1-1 (AP-35)	3.3.1-32	B
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-2 (EP-3)	3.2.1-50	C
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
				Cracking due to SCC	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
		Carbon or Low Alloy Steel	Air - Outdoor (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-21 (A-23)	3.3.1-71	A

TABLE 3.3.2-28 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FUEL OIL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Carbon or Low Alloy Steel	Fuel Oil (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H1-10 (A-30)	3.3.1-20	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	A
			Soil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Buried Piping and Tanks Inspection	VII.H1-9 (A-01)	3.3.1-19	A
				Loss of Material due to Galvanic Corrosion	Buried Piping and Tanks Inspection	VII.H1-9 (A-01)		H

TABLE 3.3.2-28 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FUEL OIL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Copper and Copper Alloys	Fuel Oil (Inside)	Cracking due to SCC	Fuel Oil Chemistry and One-Time Inspection			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H1-3 (AP-44)	3.3.1-32	B
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C
		Glass	Fuel Oil (Inside)	None	None	VII.J-9 (AP-49)	3.3.1-93	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A

TABLE 3.3.2-28 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FUEL OIL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Gray Cast Iron	Raw Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.H2-14 (A-51)	3.3.1-85	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-21 (A-23)	3.3.1-71	A
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-21 (A-23)		H
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
		Stainless Steel	Air - Outdoor (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Fuel Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H1-6 (AP-54)	3.3.1-32	B

TABLE 3.3.2-28 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FUEL OIL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Stainless Steel	Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
System strainers	M-1	Carbon or Low Alloy Steel	Fuel Oil (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H1-10 (A-30)	3.3.1-20	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A

TABLE 3.3.2-28 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FUEL OIL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
System strainers (continued)	M-1	Copper and Copper Alloys	Fuel Oil (Inside)	Cracking due to SCC	Fuel Oil Chemistry and One-Time Inspection			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H1-3 (AP-44)	3.3.1-32	B
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C
	M-2	Copper and Copper Alloys	Fuel Oil (Outside)	Cracking due to SCC	Fuel Oil Chemistry and One-Time Inspection			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H1-3 (AP-44)	3.3.1-32	B

TABLE 3.3.2-29 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – JACKET COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Diesel Standby Coolant Pumps	M-1	Gray Cast Iron	Closed Cycle Cooling Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-8 (A-50)	3.3.1-85	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
EDG Air Cooler Coolant Radiator Components	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.H2-21 (A-23)	3.3.1-71	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A

TABLE 3.3.2-29 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – JACKET COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
EDG Air Cooler Coolant Radiator Components (continued)	M-1	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	D
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C
EDG Air Cooler Coolant Radiator Tubes	M-5	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	B
			Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
EDG Combustion Air Cooler Components	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A

TABLE 3.3.2-29 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – JACKET COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
EDG Combustion Air Cooler Components (continued)	M-1	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	D
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C
EDG Combustion Air Cooler Tubes	M-5	Aluminum or Aluminum Alloys	Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components			J
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	B
			Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components			J

TABLE 3.3.2-29 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – JACKET COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
EDG Electric Standby Heater Housing	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
		Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
EDG Jacket Coolant Radiator Components	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-21 (A-23)	3.3.1-71	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A

TABLE 3.3.2-29 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – JACKET COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
EDG Jacket Coolant Radiator Components (continued)	M-1	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	D
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C
EDG Jacket Coolant Radiator Tubes	M-5	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	B
			Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
EFP-3 Aftercooler Components	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A

TABLE 3.3.2-29 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – JACKET COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
EFP-3 Aftercooler Components (continued)	M-1	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	D
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C
EFP-3 Aftercooler Tubes	M-5	Aluminum or Aluminum Alloys	Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	B
			Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J

TABLE 3.3.2-29 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – JACKET COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
EFP-3 Gearbox Lube Oil Cooler Components	M-1	Aluminum or Aluminum Alloys	Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection			J
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-2 (EP-3)	3.2.1-50	C
		Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-2 (A-08)	3.3.1-72	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
		Copper and Copper Alloys	Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.C2-5 (AP-47)	3.3.1-26	C
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C

TABLE 3.3.2-29 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – JACKET COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
EFP-3 Gearbox Lube Oil Cooler Tubes	M-5	Aluminum or Aluminum Alloys	Lubricating Oil (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Lubricating Oil Analysis and One-Time Inspection			J
			Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
		Copper and Copper Alloys	Lubricating Oil (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Lubricating Oil Analysis and One-Time Inspection	VIII.G-8 (SP-53)	3.4.1-10	C
			Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J

TABLE 3.3.2-29 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – JACKET COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
EFP-3 Immersion Heater Housing	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
		Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
EFP-3 Lube Oil Cooler Components	M-1	Aluminum or Aluminum Alloys	Lubricating Oil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection			J
		Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	B

TABLE 3.3.2-29 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – JACKET COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
EFP-3 Lube Oil Cooler Components (continued)	M-1	Carbon or Low Alloy Steel	Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.C2-13 (AP-30)	3.3.1-14	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	D
			Lubricating Oil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.C2-5 (AP-47)	3.3.1-26	C

TABLE 3.3.2-29 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – JACKET COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
EFP-3 Lube Oil Cooler Tubes	M-5	Aluminum or Aluminum Alloys	Lubricating Oil (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Lubricating Oil Analysis and One-Time Inspection			J
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	B
			Lubricating Oil (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Lubricating Oil Analysis and One-Time Inspection	VIII.G-8 (SP-53)	3.4.1-10	C
EFP-3 Radiator Components	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-2 (A-08)	3.3.1-72	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	D
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C

TABLE 3.3.2-29 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – JACKET COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
EFP-3 Radiator Tubes	M-5	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	B
			Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
Expansion Joints	M-1	Elastomers	Closed Cycle Cooling Water (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation Loss of Material due to Wear	External Surfaces Monitoring			J
Fan Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A

TABLE 3.3.2-29 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – JACKET COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting elements	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
		Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
	M-3	Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B

TABLE 3.3.2-29 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – JACKET COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.C2-13 (AP-30)	3.3.1-14	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A

TABLE 3.3.2-29 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – JACKET COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	B
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	B
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C
		Galvanized Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
				Loss of Material due to Galvanic Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	D
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A

TABLE 3.3.2-29 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – JACKET COOLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Glass	Closed Cycle Cooling Water (Inside)	None	None	VII.J-13 (AP-51)	3.3.1-93	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
		Gray Cast Iron	Closed Cycle Cooling Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-8 (A-50)	3.3.1-85	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
		Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-30 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR LUBE OIL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
EDG Lube Oil Cooler Components	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	B
			Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-5 (AP-39)	3.3.1-21	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A

TABLE 3.3.2-30 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR LUBE OIL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
EDG Lube Oil Cooler Components (continued)	M-1	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.H2-8 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.H2-12 (AP-43)	3.3.1-84	D
			Lubricating Oil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-10 (AP-47)	3.3.1-26	C
EDG Lube Oil Cooler Tubes	M-5	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	B
			Lubricating Oil (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Lubricating Oil Analysis and One-Time Inspection	VIII.G-8 (SP-53)	3.4.1-10	C
EDG Lube Oil Keep-Warm Electric Heater Housing	M-1	Carbon or Low Alloy Steel	Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-20 (AP-30)	3.3.1-14	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A

TABLE 3.3.2-30 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR LUBE OIL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
EFP-3 Gearbox Lube Oil Reservoir	M-1	Carbon or Low Alloy Steel	Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-20 (AP-30)	3.3.1-14	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
Expansion Joints	M-1	Stainless Steel	Lubricating Oil (Inside)	Cracking due to SCC	Lubricating Oil Analysis and One-Time Inspection			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-17 (AP-59)	3.3.1-33	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-30 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR LUBE OIL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection			J
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-2 (EP-3)	3.2.1-50	C
		Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.H2-23 (A-25)	3.3.1-47	B
			Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-20 (AP-30)	3.3.1-14	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
		Copper and Copper Alloys	Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-10 (AP-47)	3.3.1-26	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C

TABLE 3.3.2-30 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR LUBE OIL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Glass	Lubricating Oil (Inside)	None	None	VII.J-10 (AP-15)	3.3.1-93	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
		Gray Cast Iron	Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-20 (AP-30)	3.3.1-14	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
		Stainless Steel	Lubricating Oil (Inside)	Cracking due to SCC	Lubricating Oil Analysis and One-Time Inspection			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-17 (AP-59)	3.3.1-33	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-30 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR LUBE OIL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
System strainers	M-1	Carbon or Low Alloy Steel	Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-20 (AP-30)	3.3.1-14	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
		Copper and Copper Alloys	Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-10 (AP-47)	3.3.1-26	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C
	M-2	Copper and Copper Alloys	Lubricating Oil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-10 (AP-47)	3.3.1-26	A
		Stainless Steel	Lubricating Oil (Outside)	Cracking due to SCC	Lubricating Oil Analysis and One-Time Inspection			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-17 (AP-59)	3.3.1-33	A

TABLE 3.3.2-31 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DOMESTIC WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Piping, piping components, piping elements, and tanks	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-31 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DOMESTIC WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Copper and Copper Alloys	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C1-10 (A-47)	3.3.1-84	D
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C, 307
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
		Glass	Raw Water (Inside)	None	None	VII.J-11 (AP-50)	3.3.1-93	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A

TABLE 3.3.2-31 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DOMESTIC WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Stainless Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
System strainer screens/elements	M-1	Copper and Copper Alloys	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C1-10 (A-47)	3.3.1-84	D
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J

TABLE 3.3.2-31 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DOMESTIC WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
System strainer screens/elements (continued)	M-2	Stainless Steel	Raw Water (Outside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J

TABLE 3.3.2-32 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DEMINERALIZED WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Containment isolation piping and components	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-29 (SP-16)	3.4.1-16	C
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Flow restricting elements	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-29 (SP-16)	3.4.1-16	C
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
	M-3	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-29 (SP-16)	3.4.1-16	C

TABLE 3.3.2-32 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DEMINERALIZED WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A
		Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-34 (S-10)	3.4.1-04	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-5)	3.4.1-41	C, 307
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A

TABLE 3.3.2-32 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DEMINERALIZED WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Glass	Treated Water (Inside)	None	None	VII.J-13 (AP-51)	3.3.1-93	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
		Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-29 (SP-16)	3.4.1-16	C
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-33 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY DIESEL GENERATOR SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Diesel Exhaust Silencers	M-1	Carbon or Low Alloy Steel	Diesel Exhaust (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-2 (A-27)	3.3.1-18	E
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C
				Loss of Material due to Galvanic Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)		H

TABLE 3.3.2-33 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY DIESEL GENERATOR SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Diesel Exhaust Silencers (continued)	M-1	Stainless Steel	Diesel Exhaust (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.H2-2 (A-27)	3.3.1-18	E
				Cracking due to SCC	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.H2-1 (AP-33)	3.3.1-06	E
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J

TABLE 3.3.2-33 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY DIESEL GENERATOR SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
EDG Starting Air Receivers	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Flow Blockage due to Fouling	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 318
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-21 (A-23)	3.3.1-71	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
Expansion Joints	M-1	Stainless Steel	Diesel Exhaust (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-2 (A-27)	3.3.1-18	E
				Cracking due to SCC	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-1 (AP-33)	3.3.1-06	E
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-33 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY DIESEL GENERATOR SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping Insulation	M-6	Insulation	Air - Indoor Uncontrolled (Outside)	None	None			J
Piping, piping components, piping elements, and tanks	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Flow Blockage due to Fouling	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 318
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-21 (A-23)	3.3.1-71	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
		Copper and Copper Alloys	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C

TABLE 3.3.2-33 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY DIESEL GENERATOR SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Stainless Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
System strainers	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Flow Blockage due to Fouling	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 318
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-21 (A-23)	3.3.1-71	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
	M-2	Stainless Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J

TABLE 3.3.2-34 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FLOOR DRAINS SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
		Copper and Copper Alloys	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-13 (A-47)	3.3.1-84	D

TABLE 3.3.2-34 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FLOOR DRAINS SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Copper and Copper Alloys	Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C
		Gray Cast Iron	Raw Water (Inside)	Flow Blockage due to Fouling	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	C
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-14 (A-51)	3.3.1-85	D
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A

TABLE 3.3.2-34 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FLOOR DRAINS SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-35 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FUEL HANDLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment isolation piping and components	M-1	Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None			J
			Treated Water (Inside)	Cracking due to SCC	Water Chemistry			J, 302
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.A2-1 (AP-79)	3.3.1-91	A, 325
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Treated Water (Outside)	Cracking due to SCC	Water Chemistry			J, 302
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.A2-1 (AP-79)	3.3.1-91	A, 324

TABLE 3.3.2-36 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
			Air - Outdoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-1 (AP-28)	3.3.1-43	A

TABLE 3.3.2-36 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting (continued)	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Soil (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity			J
				Loss of Material due to Galvanic Corrosion	Buried Piping and Tanks Inspection			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Buried Piping and Tanks Inspection	VII.H1-9 (A-01)	3.3.1-19	C
Containment isolation piping and components	M-1	Stainless Steel	Fire Water (Inside)	Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Fire Water System			J
				Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-19 (A-55)	3.3.1-69	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-36 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Diesel Driven Fire Pump	M-1	Gray Cast Iron	Fire Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-14 (A-51)	3.3.1-85	B
				Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-24 (A-33)	3.3.1-68	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
Diesel Driven Fire Pump Fuel Oil Storage Tank	M-1	Carbon or Low Alloy Steel	Fuel Oil (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H2-24 (A-30)	3.3.1-20	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A

TABLE 3.3.2-36 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fan Housings	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-23 (A-23)	3.3.1-71	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
Fire Service Water Storage Tanks	M-1	Carbon or Low Alloy Steel	Fire Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-24 (A-33)	3.3.1-68	A
			Air - Outdoor (Outside)	Loss of Material due to Galvanic Corrosion	Aboveground Carbon Steel Tanks			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Aboveground Carbon Steel Tanks	VIII.G-40 (S-31)	3.4.1-20	C

TABLE 3.3.2-36 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Motor Driven Fire Pump	M-1	Gray Cast Iron	Fire Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-14 (A-51)	3.3.1-85	B
				Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-24 (A-33)	3.3.1-68	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
Piping, piping components, standpipes, hydrants, and tanks	M-1	Carbon or Low Alloy Steel	Diesel Exhaust (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Cumulative Fatigue Damage due to Fatigue	TLAA			J
			Dried Air (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Dry Gas (Inside)	None	None	VII.J-23 (AP-6)	3.3.1-97	A

TABLE 3.3.2-36 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, standpipes, hydrants, and tanks (continued)	M-1	Carbon or Low Alloy Steel	Fire Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-24 (A-33)	3.3.1-68	A
			Fuel Oil (Inside)	Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Fire Protection and Fuel Oil Chemistry			J
				Flow Blockage due to Fouling	Fire Protection and Fuel Oil Chemistry			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Fire Protection and Fuel Oil Chemistry	VII.G-21 (A-28)	3.3.1-64	B

TABLE 3.3.2-36 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, standpipes, hydrants, and tanks (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
				Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-9 (A-78)	3.3.1-58	A
			Soil (Outside)	Loss of Material due to Galvanic Corrosion	Buried Piping and Tanks Inspection			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Buried Piping and Tanks Inspection	VII.G-25 (A-01)	3.3.1-19	A

TABLE 3.3.2-36 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, standpipes, hydrants, and tanks (continued)	M-1	Copper and Copper Alloys	Fire Water (Inside)	Loss of Material due to Galvanic Corrosion	Fire Water System			J
				Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-12 (A-45)	3.3.1-70	A
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-13 (A-47)	3.3.1-84	B
			Fuel Oil (Inside)	Cracking due to SCC	Fuel Oil Chemistry and One-Time Inspection			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.G-10 (AP-44)	3.3.1-32	B
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C, 307
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A

TABLE 3.3.2-36 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, standpipes, hydrants, and tanks (continued)	M-1	Glass	Fire Water (Inside)	None	None	VII.J-11 (AP-50)	3.3.1-93	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
		Gray Cast Iron	Fire Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-14 (A-51)	3.3.1-85	B
				Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-24 (A-33)	3.3.1-68	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-36 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, standpipes, hydrants, and tanks (continued)	M-1	Gray Cast Iron	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
				Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-9 (A-78)	3.3.1-58	A
			Soil (Outside)	Loss of Material due to Galvanic Corrosion	Buried Piping and Tanks Inspection			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Buried Piping and Tanks Inspection	VII.G-25 (A-01)	3.3.1-19	A
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-15 (A-02)	3.3.1-85	B

TABLE 3.3.2-36 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, standpipes, hydrants, and tanks (continued)	M-1	PVC or Thermo-plastics	Fire Water (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Fire Water System			J
			Soil (Outside)	None	None			J
		Stainless Steel	Fire Water (Inside)	Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Fire Water System			J
				Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-19 (A-55)	3.3.1-69	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-36 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Sprinkler Heads and Spray Nozzles	M-8	Copper and Copper Alloys	Air - Indoor Uncontrolled (Inside)	None	None	V.F-3 (EP-10)	3.2.1-53	C
			Fire Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-12 (A-45)	3.3.1-70	A
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-13 (A-47)	3.3.1-84	B
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-3 (EP-10)	3.2.1-53	C
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Fire Water System			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J

TABLE 3.3.2-36 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
System strainers	M-1	Carbon or Low Alloy Steel	Fire Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-24 (A-33)	3.3.1-68	A
		Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper and Copper Alloys	Fire Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-12 (A-45)	3.3.1-70	A
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-13 (A-47)	3.3.1-84	B
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C, 307

TABLE 3.3.2-36 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
System strainers (continued)	M-1	Gray Cast Iron	Fire Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-14 (A-51)	3.3.1-85	B
				Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-24 (A-33)	3.3.1-68	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
	M-2	Stainless Steel	Fire Water (Outside)	Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Fire Water System			J
				Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-19 (A-55)	3.3.1-69	A

TABLE 3.3.2-37 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – HYDROGEN SUPPLY SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Dry Gas (Inside)	None	None	VII.J-23 (AP-6)	3.3.1-97	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-38 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – INSTRUMENT AIR SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
			Air - Outdoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-1 (AP-28)	3.3.1-43	A
Containment isolation piping and components	M-1	Carbon or Low Alloy Steel	Dried Air (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-38 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – INSTRUMENT AIR SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Evaporative Cooler Coils	M-5	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System			J
			Raw Water (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
Evaporative Cooler Components	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 315
			Air - Outdoor (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-9 (A-78)	3.3.1-58	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.I-9 (A-78)		H

TABLE 3.3.2-38 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – INSTRUMENT AIR SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Evaporative Cooler Components (continued)	M-1	PVC or Thermo-plastics	Raw Water (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 315
			Air - Outdoor (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
Instrument Air Dryers	M-1	Carbon or Low Alloy Steel	Dried Air (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
		Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-3 (EP-10)	3.2.1-53	C
		Stainless Steel	Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-38 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – INSTRUMENT AIR SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Instrument Air Receivers	M-1	Carbon or Low Alloy Steel	Dried Air (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 315
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
Piping, piping components, piping elements, and tanks	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 315
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-2 (EP-3)	3.2.1-50	C

TABLE 3.3.2-38 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – INSTRUMENT AIR SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 322
			Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Dried Air (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 315

TABLE 3.3.2-38 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – INSTRUMENT AIR SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
			Air - Outdoor (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-9 (A-78)	3.3.1-58	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.I-9 (A-78)		H
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	B
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	B
			Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components			J, 315
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J, 315

TABLE 3.3.2-38 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – INSTRUMENT AIR SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Copper and Copper Alloys	Air - Indoor Uncontrolled (Outside)	None	None	V.F-3 (EP-10)	3.2.1-53	C, 307
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
		Fiber Glass or Fiber Reinforced Plastic	Raw Water (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 315
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring			J
		Gray Cast Iron	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 322
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J, 322

TABLE 3.3.2-38 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – INSTRUMENT AIR SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Gray Cast Iron	Closed Cycle Cooling Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-8 (A-50)	3.3.1-85	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
		PVC or Thermo-plastics	Raw Water (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 315
			Air - Outdoor (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring			J
		Stainless Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 322

TABLE 3.3.2-38 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – INSTRUMENT AIR SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
			Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 315
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J

TABLE 3.3.2-38 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – INSTRUMENT AIR SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
System strainers	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
	M-2	Stainless Steel	Closed Cycle Cooling Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B

TABLE 3.3.2-39 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR COOLANT PUMP LUBE OIL COLLECTION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.G-26 (A-83)	3.3.1-15	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper and Copper Alloys	Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.G-11 (AP-47)	3.3.1-26	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A

TABLE 3.3.2-39 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR COOLANT PUMP LUBE OIL COLLECTION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
			Lubricating Oil (Inside)	Cracking due to SCC	Lubricating Oil Analysis and One-Time Inspection			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.G-18 (AP-59)	3.3.1-33	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
RCP Motor Lube Oil Collection Drip Pans	M-1	Stainless Steel	Lubricating Oil (Inside)	Cracking due to SCC	Lubricating Oil Analysis and One-Time Inspection			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.G-18 (AP-59)	3.3.1-33	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

TABLE 3.3.2-39 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR COOLANT PUMP LUBE OIL COLLECTION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RCP Motor Lube Oil Collection Tanks	M-1	Carbon or Low Alloy Steel	Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.G-27 (A-82)	3.3.1-16	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-40 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – LEAK RATE TEST SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
			Air - Outdoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-1 (AP-28)	3.3.1-43	A
Containment isolation piping and components	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-40 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – LEAK RATE TEST SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment isolation piping and components (continued)	M-1	Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 321
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Air - Indoor Uncontrolled (Inside)	None	None	V.F-2 (EP-3)	3.2.1-50	C
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-2 (EP-3)	3.2.1-50	C
		Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
			Air - Outdoor (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-9 (A-78)	3.3.1-58	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.I-9 (A-78)		H

TABLE 3.3.2-40 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – LEAK RATE TEST SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Copper and Copper Alloys	Air - Indoor Uncontrolled (Inside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C, 321
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C
		Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 321
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-41 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MISCELLANEOUS DRAINS SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Piping, piping components, piping elements, and tanks	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	C
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.B1-11 (S-10)	3.4.1-04	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
		Glass	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
			Treated Water (Inside)	None	None	VII.J-13 (AP-51)	3.3.1-93	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A

TABLE 3.3.2-41 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MISCELLANEOUS DRAINS SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Gray Cast Iron	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VIII.B1-7 (SP-60)	3.4.1-30	C
			Raw Water (Inside)	Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VIII.B1-7 (SP-60)	3.4.1-30	C
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-14 (A-51)	3.3.1-85	D

TABLE 3.3.2-41 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MISCELLANEOUS DRAINS SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Gray Cast Iron	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.B1-11 (S-10)	3.4.1-04	C
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-16 (AP-31)	3.3.1-85	D
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
Piping, piping components, piping elements, and tanks (continued)	M-1	PVC or Thermo-plastics	Raw Water (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring			J

TABLE 3.3.2-42 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAKE UP & PURIFICATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Containment isolation piping and components	M-1	Cast Austenitic Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Loss of Fracture Toughness due to Thermal Embrittlement	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.C2-6 (R-08)	3.1.1-55	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-5 (R-09)	3.1.1-68	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	VII.E1-16 (A-57)	3.3.1-02	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-42 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAKE UP & PURIFICATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment isolation piping and components (continued)	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-5 (R-09)	3.1.1-68	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	VII.E1-16 (A-57)	3.3.1-02	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Flow restricting elements	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
	M-3	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A

TABLE 3.3.2-42 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAKE UP & PURIFICATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
HPI Pump Cyclone Separators	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
	M-2	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A
HPI Pump Lube Oil Strainer	M-1	Carbon or Low Alloy Steel	Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.E1-19 (AP-30)	3.3.1-14	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
	M-2	Stainless Steel	Lubricating Oil (Outside)	Cracking due to SCC	Lubricating Oil Analysis and One-Time Inspection			J
				Flow Blockage due to Fouling	Lubricating Oil Analysis and One-Time Inspection			J

TABLE 3.3.2-42 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAKE UP & PURIFICATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
HPI Pump Lube Oil Strainer (continued)	M-2	Stainless Steel	Lubricating Oil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.E1-15 (AP-59)	3.3.1-33	A
HPI Pumps	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to Cyclic Loading Cracking due to SCC	Water Chemistry and One-Time Inspection	VII.E1-7 (A-76)	3.3.1-09	E
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Letdown Cooler Components	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.E1-6 (A-63)	3.3.1-48	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-42 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAKE UP & PURIFICATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Letdown Cooler Components (continued)	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to Cyclic Loading Cracking due to SCC	Water Chemistry and One-Time Inspection	VII.E1-9 (A-69)	3.3.1-07	E
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	C
			Closed Cycle Cooling Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	D
				Cracking due to SCC	Closed-Cycle Cooling Water System	VII.C2-11 (AP-60)	3.3.1-46	D
Letdown Cooler Tubes	M-5	Stainless Steel	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Water Chemistry and One-Time Inspection	V.A-16 (EP-34)	3.2.1-10	C
			Closed Cycle Cooling Water (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-3 (AP-63)	3.3.1-52	B
Orifice (miniflow recirculation)	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-42 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAKE UP & PURIFICATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Orifice (miniflow recirculation) (continued)	M-3	Stainless Steel	Treated Water (Inside)	Loss of Material due to Erosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	V.D1-14 (E-24)	3.2.1-12	E
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A
Piping Insulation	M-6	Insulation	Air - Indoor Uncontrolled (Outside)	None	None			J
Piping, piping components, piping elements, and tanks	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A
		Carbon or Low Alloy Steel	Dried Air (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Dry Gas (Inside)	None	None	VII.J-23 (AP-6)	3.3.1-97	A
			Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.E1-19 (AP-30)	3.3.1-14	A

TABLE 3.3.2-42 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAKE UP & PURIFICATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Cast Austenitic Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Loss of Fracture Toughness due to Thermal Embrittlement	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.C2-6 (R-08)	3.1.1-55	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-5 (R-09)	3.1.1-68	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	VII.E1-16 (A-57)	3.3.1-02	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-42 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAKE UP & PURIFICATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.E1-12 (AP-47)	3.3.1-26	A
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-3 (EP-10)	3.2.1-53	C, 312
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Glass	Lubricating Oil (Inside)	None	None	VII.J-10 (AP-15)	3.3.1-93	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
		Stainless Steel	Dry Gas (Inside)	None	None	VII.J-19 (AP-22)	3.3.1-97	A
			Treated Water (Inside)	Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-5 (R-09)	3.1.1-68	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	VII.E1-16 (A-57)	3.3.1-02	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-42 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAKE UP & PURIFICATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Seal Return Cooler Components	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	C
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	C
			Closed Cycle Cooling Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	D
				Cracking due to SCC	Closed-Cycle Cooling Water System	VII.C2-11 (AP-60)	3.3.1-46	D

TABLE 3.3.2-42 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAKE UP & PURIFICATION SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Seal Return Cooler Tubes	M-5	Stainless Steel	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Water Chemistry and One-Time Inspection	V.A-16 (EP-34)	3.2.1-10	C
			Closed Cycle Cooling Water (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-3 (AP-63)	3.3.1-52	B

TABLE 3.3.2-43 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MISCELLANEOUS MECHANICAL & STRUCTURES SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting and components	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Outdoor (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-9 (A-78)	3.3.1-58	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.I-9 (A-78)		H
Ducting Closure Bolting	M-1	Carbon or Low Alloy Steel	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J

TABLE 3.3.2-44 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NITROGEN SUPPLY SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Containment isolation piping and components	M-1	Carbon or Low Alloy Steel	Dry Gas (Inside)	None	None	VII.J-23 (AP-6)	3.3.1-97	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Dry Gas (Inside)	None	None	VII.J-19 (AP-22)	3.3.1-97	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-44 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NITROGEN SUPPLY SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Dry Gas (Inside)	None	None	VII.J-2 (AP-37)	3.3.1-97	A
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-2 (EP-3)	3.2.1-50	C, 307
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A
		Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 320
			Dry Gas (Inside)	None	None	VII.J-23 (AP-6)	3.3.1-97	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-44 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NITROGEN SUPPLY SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Copper and Copper Alloys	Dry Gas (Inside)	None	None	VII.J-4 (AP-9)	3.3.1-97	A
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-3 (EP-10)	3.2.1-53	C, 307
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Glass	Dry Gas (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
		Stainless Steel	Dry Gas (Inside)	None	None	VII.J-19 (AP-22)	3.3.1-97	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-45 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – PENETRATION COOLING AUXILIARY SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Ducting and components	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-2 (A-10)	3.3.1-56	A
Ducting Closure Bolting	M-1	Galvanized Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.F2-4 (A-105)	3.3.1-55	A

TABLE 3.3.2-45 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – PENETRATION COOLING AUXILIARY SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A

TABLE 3.3.2-46 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING AIRLOCK SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
			Air - Outdoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-1 (AP-28)	3.3.1-43	A
Containment isolation piping and components	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to General Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-23 (A-23)	3.3.1-71	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
			Air - Outdoor (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-9 (A-78)	3.3.1-58	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.I-9 (A-78)		H

TABLE 3.3.2-46 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING AIRLOCK SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to General Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-23 (A-23)	3.3.1-71	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A, 307
		Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-47 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – ROOF DRAINS SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		PVC or Thermo-plastics	Raw Water (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring			J

TABLE 3.3.2-48 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – RADIATION MONITORING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Outdoor (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A

TABLE 3.3.2-48 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – RADIATION MONITORING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Copper and Copper Alloys	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-5 (AP-11)	3.3.1-99	A, 308
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-5 (AP-11)	3.3.1-99	A, 308
		Elastomers	Air - Indoor Uncontrolled (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring			J
		Glass	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A

TABLE 3.3.2-48 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – RADIATION MONITORING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air - Outdoor (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J

TABLE 3.3.2-49 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICE AND DECAY HEAT SEA WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Cyclone Separators	M-1	Stainless Steel	Open Cycle Cooling Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-15 (A-54)	3.3.1-79	A
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Open-Cycle Cooling Water System	V.D1-25 (EP-55)	3.2.1-37	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J

TABLE 3.3.2-49 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICE AND DECAY HEAT SEA WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Cyclone Separators (continued)	M-2	Stainless Steel	Open Cycle Cooling Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-15 (A-54)	3.3.1-79	A
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Open-Cycle Cooling Water System	V.D1-25 (EP-55)	3.2.1-37	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
Expansion Joints	M-1	Elastomers	Open Cycle Cooling Water (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Open-Cycle Cooling Water System	VII.C1-1 (AP-75)	3.3.1-75	A
				Loss of Material due to Erosion	Open-Cycle Cooling Water System	VII.C1-2 (AP-76)	3.3.1-75	A
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation Loss of Material due to Wear	Open-Cycle Cooling Water System			J

TABLE 3.3.2-49 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICE AND DECAY HEAT SEA WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow Restricting Orifice Housing/Plates	M-1	Carbon or Low Alloy Steel	Open Cycle Cooling Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-19 (A-38)	3.3.1-76	A
				Loss of Material due to Galvanic Corrosion	Open-Cycle Cooling Water System	VII.C1-5 (A-64)	3.3.1-77	C
		Stainless Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
	M-3	Stainless Steel	Open Cycle Cooling Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-15 (A-54)	3.3.1-79	A
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Open-Cycle Cooling Water System	V.D1-25 (EP-55)	3.2.1-37	C

TABLE 3.3.2-49 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICE AND DECAY HEAT SEA WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Motor Cooler Components	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	C
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	D

TABLE 3.3.2-49 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICE AND DECAY HEAT SEA WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Motor Cooler Components (continued)	M-1	Copper and Copper Alloys	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
			Raw Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C1-4 (A-66)	3.3.1-84	B
Motor Cooler Tubes	M-5	Aluminum or Aluminum Alloys	Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	B
			Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J

TABLE 3.3.2-49 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICE AND DECAY HEAT SEA WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Nuclear Service and Decay Heat Sea Water Pumps	M-1	Carbon or Low Alloy Steel	Open Cycle Cooling Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-19 (A-38)	3.3.1-76	A
				Loss of Material due to Galvanic Corrosion	Open-Cycle Cooling Water System	VII.C1-5 (A-64)	3.3.1-77	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-49 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICE AND DECAY HEAT SEA WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Nuclear Service and Decay Heat Sea Water Pumps (continued)	M-1	Gray Cast Iron	Open Cycle Cooling Water (Inside)	Loss of Material due to Selective Leaching	Open-Cycle Cooling Water System	VII.C1-11 (A-51)	3.3.1-85	E, 305
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-19 (A-38)	3.3.1-76	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Open Cycle Cooling Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-15 (A-54)	3.3.1-79	A
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Open-Cycle Cooling Water System	V.D1-25 (EP-55)	3.2.1-37	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J

TABLE 3.3.2-49 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICE AND DECAY HEAT SEA WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Nuclear Services and Decay Heat Sea Water Pump Strainer Screens/Elements	M-1	Stainless Steel	Open Cycle Cooling Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-15 (A-54)	3.3.1-79	A
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Open-Cycle Cooling Water System	V.D1-25 (EP-55)	3.2.1-37	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
	M-2	Stainless Steel	Open Cycle Cooling Water (Outside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-15 (A-54)	3.3.1-79	A
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Open-Cycle Cooling Water System	V.D1-25 (EP-55)	3.2.1-37	C
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A

TABLE 3.3.2-49 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICE AND DECAY HEAT SEA WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Open Cycle Cooling Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-19 (A-38)	3.3.1-76	A
				Loss of Material due to Galvanic Corrosion	Open-Cycle Cooling Water System	VII.C1-5 (A-64)	3.3.1-77	C
		Carbon or Low Alloy Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 323
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-49 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICE AND DECAY HEAT SEA WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Soil (Outside)	Loss of Material due to Galvanic Corrosion	Buried Piping and Tanks Inspection			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Buried Piping and Tanks Inspection	VII.C1-18 (A-01)	3.3.1-19	A
		Copper and Copper Alloys	Open Cycle Cooling Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-9 (A-44)	3.3.1-81	A
				Loss of Material due to Selective Leaching	Open-Cycle Cooling Water System	VII.C1-10 (A-47)	3.3.1-84	E, 305
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C1-10 (A-47)	3.3.1-84	B
				Loss of Material due to Galvanic Corrosion	Open-Cycle Cooling Water System	VII.C1-3 (A-65)	3.3.1-82	C

TABLE 3.3.2-49 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICE AND DECAY HEAT SEA WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Copper and Copper Alloys	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Fiber Glass or Fiber Reinforced Plastic	Open Cycle Cooling Water (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
		Glass	Raw Water (Inside)	None	None	VII.J-11 (AP-50)	3.3.1-93	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A

TABLE 3.3.2-49 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICE AND DECAY HEAT SEA WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Gray Cast Iron	Open Cycle Cooling Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C1-11 (A-51)	3.3.1-85	B
				Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-19 (A-38)	3.3.1-76	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-49 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICE AND DECAY HEAT SEA WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Reinforced Concrete	Open Cycle Cooling Water (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms Loss of Material due to Various Degradation Mechanisms	Open-Cycle Cooling Water System			J, 303
			Soil (Outside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms Loss of Material due to Various Degradation Mechanisms	Structures Monitoring Program			J, 303
		Stainless Steel	Open Cycle Cooling Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-15 (A-54)	3.3.1-79	A
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Open-Cycle Cooling Water System	VII.H2-18 (AP-55)	3.3.1-80	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J

TABLE 3.3.2-49 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICE AND DECAY HEAT SEA WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Raw Water Pump Sump Sluice Gate	M-1	Gray Cast Iron	Open Cycle Cooling Water (Outside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C1-11 (A-51)	3.3.1-85	D
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-19 (A-38)	3.3.1-76	C

TABLE 3.3.2-50 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – STATION AIR SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
			Air - Outdoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-1 (AP-28)	3.3.1-43	A
Containment isolation piping and components	M-1	Carbon or Low Alloy Steel	Dried Air (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-50 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – STATION AIR SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment isolation piping and components (continued)	M-1	Carbon or Low Alloy Steel	Air - Outdoor (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-9 (A-78)	3.3.1-58	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.I-9 (A-78)		H
		Stainless Steel	Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J

TABLE 3.3.2-50 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – STATION AIR SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks	M-1	Aluminum or Aluminum Alloys	Air - Indoor Uncontrolled (Inside)	None	None	V.F-2 (EP-3)	3.2.1-50	C
			Dried Air (Inside)	None	None			J
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 326
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-2 (EP-3)	3.2.1-50	C
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
				Cracking due to SCC	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J

TABLE 3.3.2-50 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – STATION AIR SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Dried Air (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 326
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
			Air - Outdoor (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-9 (A-78)	3.3.1-58	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.I-9 (A-78)		H

TABLE 3.3.2-50 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – STATION AIR SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Copper and Copper Alloys	Air - Indoor Uncontrolled (Inside)	None	None			J, 321
			Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-3 (EP-10)	3.2.1-53	C, 307
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Fiber Glass or Fiber Reinforced Plastic	Raw Water (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 326
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring			J
		Galvanized Steel	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 306
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A

TABLE 3.3.2-50 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – STATION AIR SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	PVC or Thermo-plastics	Air - Indoor Uncontrolled (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring			J
		Stainless Steel	Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J

TABLE 3.3.2-50 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – STATION AIR SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Station Air Receivers	M-1	Carbon or Low Alloy Steel	Dried Air (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 326
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A

TABLE 3.3.2-51 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECONDARY SERVICES CLOSED CYCLE COOLING WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Condensate Pump Motor Cooler Components	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	C
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A

TABLE 3.3.2-51 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECONDARY SERVICES CLOSED CYCLE COOLING WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Condensate Pump Motor Cooler Components (continued)	M-1	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	D
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J

TABLE 3.3.2-51 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECONDARY SERVICES CLOSED CYCLE COOLING WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Condensate Pump Motor Cooler Tubes	M-5	Aluminum or Aluminum Alloys	Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	B
			Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
Expansion Joints	M-1	Elastomers	Closed Cycle Cooling Water (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation Loss of Material due to Wear	External Surfaces Monitoring			J

TABLE 3.3.2-51 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECONDARY SERVICES CLOSED CYCLE COOLING WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting elements	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
	M-1	Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
	M-3	Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B

TABLE 3.3.2-51 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECONDARY SERVICES CLOSED CYCLE COOLING WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-2 (EP-3)	3.2.1-50	C
		Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Dried Air (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	B
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	B

TABLE 3.3.2-51 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECONDARY SERVICES CLOSED CYCLE COOLING WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
				None	None	VIII.I-2 (SP-6)	3.4.1-41	C
			Dry Gas (Outside)	None	None	VII.J-4 (AP-9)	3.3.1-97	A
			Lubricating Oil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.C2-5 (AP-47)	3.3.1-26	A
			Raw Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J

TABLE 3.3.2-51 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECONDARY SERVICES CLOSED CYCLE COOLING WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Glass	Closed Cycle Cooling Water (Inside)	None	None	VII.J-13 (AP-51)	3.3.1-93	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
		Gray Cast Iron	Closed Cycle Cooling Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-8 (A-50)	3.3.1-85	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
		Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-51 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECONDARY SERVICES CLOSED CYCLE COOLING WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Secondary Services Closed Cycle Booster Pump	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
Secondary Services Closed Cycle Pumps	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
Secondary Services Closed Cycle Surge Tank	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Dry Gas (Inside)	None	None	VII.J-23 (AP-6)	3.3.1-97	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A

TABLE 3.3.2-51 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECONDARY SERVICES CLOSED CYCLE COOLING WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Secondary Services Heat Exchanger Components	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
		Titanium	Raw Water (Inside)	Cracking due to SCC Flow Blockage due to Fouling	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components			J
			Closed Cycle Cooling Water (Outside)	Cracking due to SCC Loss of Material due to Crevice Corrosion	Closed-Cycle Cooling Water System			J
Secondary Services Heat Exchanger Tubes	M-5	Titanium	Raw Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components			J
			Closed Cycle Cooling Water (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System			J

TABLE 3.3.2-52 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – STATION DRAINS SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A
		Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	C

TABLE 3.3.2-52 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – STATION DRAINS SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.B1-11 (S-10)	3.4.1-04	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-5 (AP-11)	3.3.1-99	A, 301
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Elastomers	Raw Water (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel- laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation Loss of Material due to Wear	External Surfaces Monitoring			J

TABLE 3.3.2-52 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – STATION DRAINS SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Gray Cast Iron	Raw Water (Inside)	Flow Blockage due to Fouling	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	C
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-14 (A-51)	3.3.1-85	D
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-52 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – STATION DRAINS SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-53 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SPENT FUEL COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Containment isolation piping and components	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.A3-8 (AP-79)	3.3.1-91	A
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	C
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Demineralizers	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.A3-8 (AP-79)	3.3.1-91	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-53 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SPENT FUEL COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting elements	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.A3-8 (AP-79)	3.3.1-91	A
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	C
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
	M-3	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.A3-8 (AP-79)	3.3.1-91	A
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	C
Piping Insulation	M-6	Insulation	Air - Indoor Uncontrolled (Outside)	None	None			J
Piping, piping components, and piping elements	M-1	Glass	Treated Water (Inside)	None	None	VII.J-13 (AP-51)	3.3.1-93	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A

TABLE 3.3.2-53 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SPENT FUEL COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.A3-8 (AP-79)	3.3.1-91	A
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	C
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Spent Fuel Cooler Components	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-53 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SPENT FUEL COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Spent Fuel Cooler Components (continued)	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.A3-8 (AP-79)	3.3.1-91	C
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	C
			Closed Cycle Cooling Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	D
				Cracking due to SCC	Closed-Cycle Cooling Water System	VII.C2-11 (AP-60)	3.3.1-46	D
Spent Fuel Cooler Tubes	M-5	Stainless Steel	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Water Chemistry			J
			Closed Cycle Cooling Water (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-3 (AP-63)	3.3.1-52	B

TABLE 3.3.2-54 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICES CLOSED CYCLE COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Containment isolation piping and components	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-54 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICES CLOSED CYCLE COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Control Rod Drive Cooling Water Filters	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Emergency NSCCC Pump Gearbox Lube Oil Cooler Components	M-1	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	D
			Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.C2-5 (AP-47)	3.3.1-26	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
			Lubricating Oil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.C2-5 (AP-47)	3.3.1-26	C

TABLE 3.3.2-54 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICES CLOSED CYCLE COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Emergency NSCCC Pump Gearbox Lube Oil Cooler Components (continued)	M-1	Gray Cast Iron	Closed Cycle Cooling Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-8 (A-50)	3.3.1-85	D
				Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Emergency NSCCC Pump Gearbox Lube Oil Cooler Tubes	M-5	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	B
			Lubricating Oil (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Lubricating Oil Analysis and One-Time Inspection	VIII.G-8 (SP-53)	3.4.1-10	C

TABLE 3.3.2-54 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICES CLOSED CYCLE COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Emergency Nuclear Services Closed Cycle Cooling Pumps	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Expansion Joints	M-1	Elastomers	Closed Cycle Cooling Water (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation Loss of Material due to Wear	External Surfaces Monitoring			J

TABLE 3.3.2-54 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICES CLOSED CYCLE COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting elements	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
	M-3	Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B

TABLE 3.3.2-54 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICES CLOSED CYCLE COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Normal Nuclear Services Closed Cycle Cooling Pump	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Normal and Emergency NSCCC Pump Motor Cooler Components	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	C
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-54 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICES CLOSED CYCLE COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Normal and Emergency NSCCC Pump Motor Cooler Components (continued)	M-1	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	D
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
			Raw Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J

TABLE 3.3.2-54 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICES CLOSED CYCLE COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Normal and Emergency NSCCC Pump Motor Cooler Tubes	M-5	Aluminum or Aluminum Alloys	Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	B
			Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
Nuclear Services Closed Cycle Cooling Heat Exchanger Components	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-54 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICES CLOSED CYCLE COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Nuclear Services Closed Cycle Cooling Heat Exchanger Components (continued)	M-1	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	D
			Open Cycle Cooling Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-3 (A-65)	3.3.1-82	A
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C1-4 (A-66)	3.3.1-84	E, 305
			Closed Cycle Cooling Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	D

TABLE 3.3.2-54 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICES CLOSED CYCLE COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Nuclear Services Closed Cycle Cooling Heat Exchanger Components (continued)	M-1	Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	D
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Nuclear Services Closed Cycle Cooling Heat Exchanger Tubes	M-5	Copper and Copper Alloys	Open Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Open-Cycle Cooling Water System	VII.C1-6 (A-72)	3.3.1-83	A
			Closed Cycle Cooling Water (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	B
Nuclear Services Closed Cycle Cooling Booster Pumps	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-54 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICES CLOSED CYCLE COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Nuclear Services Closed Cycle Cooling Water Surge Tank	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Dry Gas (Inside)	None	None	VII.J-23 (AP-6)	3.3.1-97	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
PASS NSCCC Plate Heat Exchanger	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	D
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
			Closed Cycle Cooling Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	D

TABLE 3.3.2-54 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICES CLOSED CYCLE COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
PASS NSCCC Plate Heat Exchanger Plates	M-5	Stainless Steel	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-3 (AP-63)	3.3.1-52	B
			Closed Cycle Cooling Water (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-3 (AP-63)	3.3.1-52	B
Piping Insulation	M-6	Insulation	Air - Indoor Uncontrolled (Outside)	None	None			J
Piping, piping components, piping elements, and tanks	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A
		Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	C, 311
			Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B

TABLE 3.3.2-54 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICES CLOSED CYCLE COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Carbon or Low Alloy Steel	Dried Air (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.C2-13 (AP-30)	3.3.1-14	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	C, 311
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Glass	Closed Cycle Cooling Water (Inside)	None	None	VII.J-13 (AP-51)	3.3.1-93	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A

TABLE 3.3.2-54 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NUCLEAR SERVICES CLOSED CYCLE COOLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
			Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Reactor Coolant Drain Tank Heat Exchanger Components	M-1	Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	D
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-40 (S-13)	3.4.1-06	C
System strainers	M-1	Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
	M-2	Stainless Steel	Closed Cycle Cooling Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B

TABLE 3.3.2-55 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – WASTE DISPOSAL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Containment isolation piping and components	M-1	Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Stainless Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

TABLE 3.3.2-55 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – WASTE DISPOSAL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A
		Carbon or Low Alloy Steel	Dry Gas (Inside)	None	None	VII.J-23 (AP-6)	3.3.1-97	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-8 (S-10)	3.4.1-04	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Glass	Raw Water (Inside)	None	None	VII.J-11 (AP-50)	3.3.1-93	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A

TABLE 3.3.2-55 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – WASTE DISPOSAL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Stainless Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Dry Gas (Inside)	None	None	VII.J-19 (AP-22)	3.3.1-97	A
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

TABLE 3.3.2-56 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – RADIOACTIVE GAS WASTE DISPOSAL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Containment isolation piping and components	M-1	Stainless Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping, piping components, piping elements, and tanks	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A
		Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	C

TABLE 3.3.2-56 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – RADIOACTIVE GAS WASTE DISPOSAL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Glass	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
			Raw Water (Inside)	None	None	VII.J-11 (AP-50)	3.3.1-93	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A

TABLE 3.3.2-56 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – RADIOACTIVE GAS WASTE DISPOSAL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Stainless Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Dry Gas (Inside)	None	None	VII.J-19 (AP-22)	3.3.1-97	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)	3.4.1-16	C
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

TABLE 3.3.2-57 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Containment isolation piping and components	M-1	Stainless Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Piping Insulation	M-6	Insulation	Air - Indoor Uncontrolled (Outside)	None	None			J
Piping, piping components, piping elements, and tanks	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A

TABLE 3.3.2-57 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VIII.F-17 (SP-30)	3.4.1-35	D
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A

TABLE 3.3.2-57 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Glass	Raw Water (Inside)	None	None	VII.J-11 (AP-50)	3.3.1-93	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
		Stainless Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-16 (AP-18)	3.3.1-99	A
Reactor Coolant Drain Tank	M-1	Stainless Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

TABLE 3.3.2-58 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR COOLANT AND MISCELLANEOUS WASTE EVAPORATOR SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Piping, piping components, and piping elements	M-1	Stainless Steel	Dry Gas (Inside)	None	None	VII.J-19 (AP-22)	3.3.1-97	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-16 (AP-18)	3.3.1-99	A

TABLE 3.3.2-59 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – WASTE GAS SAMPLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Piping, piping components, and piping elements	M-1	Stainless Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)	3.4.1-16	C
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-60 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – WASTE SAMPLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Containment isolation piping and components	M-1	Stainless Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping, piping components, piping elements, and tanks	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A
		Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A

TABLE 3.3.2-60 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – WASTE SAMPLING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Stainless Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-61 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – POST ACCIDENT CONTAINMENT ATMOSPHERIC SAMPLING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Containment isolation piping and components	M-1	Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A
		Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A

TABLE 3.3.2-61 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – POST ACCIDENT CONTAINMENT ATMOSPHERIC SAMPLING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

Notes for Tables 3.3.2-1 through 3.3.2-61:

Generic Notes:

A. Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B. Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C. Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D. Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E. Consistent with NUREG-1801 item for material, environment, and aging effect, but a different AMP is credited or NUREG-1801 identifies a plant-specific AMP.
F. Material not in NUREG-1801 for this component.
G. Environment not in NUREG-1801 for this component and material.
H. Aging effect not in NUREG-1801 for this component, material and environment combination.
I. Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J. Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant-specific Notes:

301. Copper tubing with Zn < 15% is not susceptible to boric acid corrosion. No aging effects have been determined for the tubing.
302. Operating Experience indicates that fuel pool liner and related components sharing the same environment and constructed of stainless steels which are not low carbon are susceptible to cracking due to SCC.
303. Buried Nuclear Service and Decay Heat Sea Water System and /Circulating Water System conduits are constructed of prestressed concrete with a steel liner. External concrete surfaces of this piping will be managed by inspections under the Structures Monitoring Program.
304. Component is located inside the Reactor Building.
305. Selective leaching is managed by periodic inspections under the Open Cycle Cooling Water System Program in specific applications where operating experience review indicates selective leaching has previously occurred.
306. Components are constructed of zinc and are normally subjected to an environment of indoor air with insufficient moisture to cause aging effects as verified by plant operating experience.
307. Components are located in areas that do not contain borated water systems.
308. Components are located in the Auxiliary Building, an area where borated water leakage may occur.
309. The system includes components located in the Intermediate Building, Fire Service Pump House, Borated Water Storage Tank (BWST) area, Auxiliary Building, and the Emergency Feedwater Tank Building. Loss of Material due to boric acid corrosion is assigned to components located in the Auxiliary Building and the BWST area.

310. Components associated with Industrial Cooling System cooling tower loops.
311. This line represents a set of pipe sleeves maintained in Tool Box EOB-12 located at the 95` elevation in the Seawater Room. The FSAR states that a pipe sleeve with pressure sealing gaskets and appropriately designed repair materials and devices, capable of withstanding pressures greater than system design, are provided and stored onsite at a readily available location to facilitate a repair in an orderly and timely manner, and in sufficient time (one to two hours) to assure safe temperatures in the control complex with no cooling flow to the control complex chillers.
312. This line represents components that either contain less than 15% Zn or are located in areas that do not contain borated water systems.
313. This line represents the demineralizer water piping tie-in shown on drawing 302-756-LR, Sheet 1(B9 - B10).
314. This line represents components that contain less than 15% Zn.
315. Components are located in an environment subjected to a) condensation produced from the air compression process, and/or b) treated domestic water located outdoors and associated with the evaporative coolers.
316. This AMR line represents the cooling coils in the Penetration Cooling and Switchgear Room Unit Air Handling Units that only have a pressure boundary intended function.
317. This component is a copper coil internal to the chiller that is used to cool lubricating oil using refrigerant.
318. Fouling due to corrosion product buildup is implicated by industry operating experience.
319. Components are associated with Miscellaneous Drains System.
320. Components are located in piping that is abandoned in place.
321. Components are normally subjected to an environment of indoor air with insufficient moisture to cause aging effects as verified by plant operating experience.
322. Components are located upstream of an air dryer and may be subject to aging effects requiring management due to air-entrained moisture.
323. Components are non-safety related components associated with system drains and are outside the scope of the Open Cycle Cooling Water System Program.
324. The outside surfaces of the fuel transfer tubes in the fuel pool are exposed to Treated Water. The remaining outside surfaces are exposed to ambient air in the reactor containment and auxiliary buildings.
325. The inside surfaces of the fuel transfer tubes in the fuel pool are periodically exposed to Treated Water during refueling operations.
326. Components are located in an environment subjected to condensation produced from the air compression process.

3.4 AGING MANAGEMENT OF STEAM AND POWER CONVERSION SYSTEMS

3.4.1 INTRODUCTION

Section 3.4 provides the results of the aging management reviews (AMRs) for those components identified in Subsection 2.3.4, Steam and Power Conversion Systems, subject to aging management review. The systems or portions of systems are described in the indicated subsections.

1. Condenser Air Removal System (Subsection 2.3.4.1)
2. Auxiliary Steam System (Subsection 2.3.4.2)
3. Condensate Chemical Treatment System (As discussed in Subsection 2.3.4.3, this system contains no mechanical components/commodities requiring AMR.)
4. Condensate System (Subsection 2.3.4.4)
5. OTSG Chemical Cleaning System (Subsection 2.3.4.5)
6. CD & FW Chemical Cleaning System (Subsection 2.3.4.6)
7. Condensate Demineralizer System (Subsection 2.3.4.7)
8. Emergency Feedwater System (Subsection 2.3.4.8)
9. Electro-Hydraulic Control System (As discussed in Subsection 2.3.4.9, this system contains no mechanical components/commodities requiring AMR.)
10. Main Feedwater System (Subsection 2.3.4.10)
11. Gland Steam System (Subsection 2.3.4.11)
12. Gland Seal Water System (Subsection 2.3.4.12)
13. Heater Drains System (As discussed in Subsection 2.3.4.13, this system contains no mechanical components/commodities requiring AMR.)
14. Heater Vents System (As discussed in Subsection 2.3.4.14, this system contains no mechanical components/commodities requiring AMR.)
15. Main Feedwater Turbine Lube Oil System (Subsection 2.3.4.15)
16. Main Steam System (Subsection 2.3.4.16)

17. Relief Valve Vent System (Subsection 2.3.4.17)

18. Secondary Plant System (Subsection 2.3.4.18)

19. Cycle Startup System (Subsection 2.3.4.19)

20. Turbine Generator System (As discussed in Subsection 2.3.4.20, this system contains no mechanical components/commodities requiring AMR.)

Table 3.4.1, Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for Steam and Power Conversion Systems, provides the summary of programs evaluated in NUREG-1801 that are applicable to component/commodity groups in this Section. Table 3.4.1 uses the format of Table 1 described in Section 3.0 above.

3.4.1.1 Operating Experience

The AMR methodology applied at CR-3 included use of operating experience (OE) to confirm the set of aging effects that had been predicted through material/environment evaluations. Plant-specific and industry OE was identified and reviewed in conjunction with the aging management review. The OE review consisted of the following:

Site: In general, the site-specific OE has been captured by a review of one or more of the following as appropriate: (1) the Action Tracking database, (2) System Engineering Notebooks and System Health Reports, and (3) discussions with Site engineering personnel. This effort also may have included a review of work management and leak log records, applicable correspondence (Licensee Event Reports, etc.), and Nuclear Assessment Section assessment records. The site-specific OE review identified no additional or unique aging effects requiring management for Steam and Power Conversion Systems.

Industry: Industry OE has been captured in NUREG-1801, "Generic Aging Lessons Learned (GALL)," and is the primary method for verifying that a complete set of potential aging effects is identified. An evaluation of industry OE published since the effective date of NUREG-1801 was performed to identify any additional aging effects requiring management. This was performed using Progress Energy internal OE review process which directs the review of OE and requires that it be screened and evaluated for site applicability. OE sources subject to review include INPO and WANO items, NRC documents (Information Notices, Generic Letters, Notices of Violation, and staff reports), 10 CFR 21 reports, and vendor bulletins, as well as corporate internal OE information from Progress Energy nuclear sites. The industry OE review identified no additional unpredicted aging effects requiring management.

On-Going On-going review of plant-specific and industry operating experience is continuing to be performed in accordance with the Corrective Action Program and the Progress Energy internal OE review process.

3.4.2 RESULTS

The following tables summarize the results of the aging management review for systems in the Steam and Power Conversion Systems area.

Table 3.4.2-13 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Relief Valve Vent System

Table 3.4.2-14 Steam and Power Conversion Systems – Summary of Aging Management – Secondary Plant System

Table 3.4.2-15 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Cycle Startup System

These tables use the format of Table 2 described in Section 3.0 above.

3.4.2.1 Materials, Environment, Aging Effects Requiring Management and Aging Management Programs

The materials from which specific components/commodities are fabricated, the environments to which they are exposed, the aging effects requiring management, and the aging management programs used to manage these aging effects are provided for each of the above systems in the following subsections.

3.4.2.1.1 Condenser Air Removal System

Materials

The materials of construction for the Condenser Air Removal System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Glass
- Gray Cast Iron
- PVC or Thermoplastics
- Stainless Steel

Environment

The Condenser Air Removal System components are exposed to the following:

- Air - Indoor Uncontrolled
- Closed Cycle Cooling Water
- Dried Air
- Raw Water

Aging Effects Requiring Management

The following Condenser Air Removal System aging effects require management:

- Cracking
- Hardening and Loss of Strrength
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Condenser Air Removal System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Selective Leaching of Materials Program

3.4.2.1.2 Auxiliary Steam System

Materials

The materials of construction for the Auxiliary Steam System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Glass
- Gray Cast Iron
- Insulation
- Stainless Steel

Environment

The Auxiliary Steam System components are exposed to the following:

- Air - Indoor Uncontrolled
- Dried Air
- Steam
- Treated Water

Aging Effects Requiring Management

The following Auxiliary Steam System aging effects require management:

- Cracking
- Cumulative Fatigue Damage
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Auxiliary Steam System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Flow-Accelerated Corrosion Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- One-Time Inspection Program
- Selective Leaching of Materials Program
- Water Chemistry Program

3.4.2.1.3 Condensate System

Materials

The materials of construction for the Condensate System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Elastomers
- Fiber Glass or Fiber Reinforced Plastic
- Glass
- Gray Cast Iron
- Stainless Steel
- Titanium

Environment

The Condensate System components are exposed to the following:

- Air - Indoor Uncontrolled
- Air - Outdoor

- Dried Air
- Raw Water
- Soil
- Steam
- Treated Water

Aging Effects Requiring Management

The following Condensate System aging effects require management:

- Cracking
- Cumulative Fatigue Damage
- Flow Blockage
- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Condensate System components:

- Aboveground Steel Tanks Program
- Bolting Integrity Program
- Buried Piping and Tanks Inspection Program
- External Surfaces Monitoring Program
- Flow-Accelerated Corrosion Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- One-Time Inspection Program
- Selective Leaching of Materials Program
- Water Chemistry Program

3.4.2.1.4 OTSG Chemical Cleaning System

Materials

The materials of construction for the OTSG Chemical Cleaning System components are:

- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Glass
- Stainless Steel

Environment

The OTSG Chemical Cleaning System components are exposed to the following:

- Air - Indoor Uncontrolled
- Treated Water

Aging Effects Requiring Management

The following OTSG Chemical Cleaning System aging effects require management:

- Cumulative Fatigue Damage
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the OTSG Chemical Cleaning System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- One-Time Inspection Program
- Water Chemistry Program

3.4.2.1.5 CD & FW Chemical Cleaning System

Materials

The materials of construction for the CD & FW Chemical Cleaning System components are:

- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel

Environment

The CD & FW Chemical Cleaning System components are exposed to the following:

- Air - Indoor Uncontrolled
- Dry Gas

Aging Effects Requiring Management

The following CD & FW Chemical Cleaning System aging effects require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMP manages the aging effects for the CD & FW Chemical Cleaning System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program

3.4.2.1.6 Condensate Demineralizer System

Materials

The materials of construction for the Condensate Demineralizer System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Glass
- Stainless Steel

Environment

The Condensate Demineralizer System components are exposed to the following:

- Air - Indoor Uncontrolled
- Dried Air
- Treated Water

Aging Effects Requiring Management

The following Condensate Demineralizer System aging effects require management:

- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Condensate Demineralizer System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- One-Time Inspection Program
- Water Chemistry Program

3.4.2.1.7 Emergency Feedwater System

Materials

The materials of construction for the Emergency Feedwater System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Elastomers
- Glass
- Insulation
- Stainless Steel

Environment

The Emergency Feedwater System components are exposed to the following:

- Air - Indoor Uncontrolled
- Air - Outdoor
- Closed-Cycle Cooling Water
- Dried Air
- Dry Gas
- Lubricating Oil
- Raw Water
- Soil
- Steam
- Treated Water

Aging Effects Requiring Management

The following Emergency Feedwater System aging effects require management:

- Cracking
- Cumulative Fatigue Damage

- Hardening and Loss of Strength
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Emergency Feedwater System components:

- Bolting Integrity Program
- Buried Piping and Tanks Inspection Program
- Closed-Cycle Cooling Water System Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Lubricating Oil Analysis Program
- One-Time Inspection Program
- Selective Leaching of Materials Program
- Water Chemistry Program

3.4.2.1.8 Main Feedwater System

Materials

The materials of construction for the Main Feedwater System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Glass
- Insulation
- Stainless Steel

Environment

The Main Feedwater System components are exposed to the following:

- Air - Indoor Uncontrolled
- Dried Air
- Dry Gas
- Lubricating Oil
- Steam
- Treated Water

Aging Effects Requiring Management

The following Main Feedwater System aging effects require management:

- Cracking
- Cumulative Fatigue Damage
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Main Feedwater System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Flow-Accelerated Corrosion Program
- Lubricating Oil Analysis Program
- One-Time Inspection Program
- Water Chemistry Program

3.4.2.1.9 Gland Steam System

Materials

The materials of construction for the Gland Steam System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Stainless Steel

Environment

The Gland Steam System components are exposed to the following:

- Air - Indoor Uncontrolled
- Dried Air
- Steam
- Treated Water

Aging Effects Requiring Management

The following Gland Steam System aging effects require management:

- Cracking
- Cumulative Fatigue Damage
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Gland Steam System components:

- Bolting Integrity Program
- External Surfaces Monitoring Program
- Flow-Accelerated Corrosion Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- One-Time Inspection Program
- Selective Leaching of Materials Program
- Water Chemistry Program

3.4.2.1.10 Gland Seal Water System

Materials

The materials of construction for the Gland Seal Water System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Glass
- Gray Cast Iron
- Stainless Steel

Environment

The Gland Seal Water System components are exposed to the following:

- Air - Indoor Uncontrolled
- Dried Air
- Treated Water

Aging Effects Requiring Management

The following Gland Seal Water System aging effects require management:

- Cracking
- Cumulative Fatigue Damage
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Gland Seal Water System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- One-Time Inspection Program
- Selective Leaching of Materials Program
- Water Chemistry Program

3.4.2.1.11 Main Feedwater Turbine Lube Oil System

Materials

The materials of construction for the Main Feedwater Turbine Lube Oil System components are:

- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Glass
- Stainless Steel

Environment

The Main Feedwater Turbine Lube Oil System components are exposed to the following:

- Air - Indoor Uncontrolled
- Closed-Cycle Cooling Water
- Lubricating Oil

Aging Effects Requiring Management

The following Main Feedwater Turbine Lube Oil System aging effects require management:

- Cracking
- Flow Blockage

- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Main Feedwater Turbine Lube Oil System components:

- Bolting Integrity Program
- Closed-Cycle Cooling Water System Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Lubricating Oil Analysis Program
- One-Time Inspection Program
- Selective Leaching of Materials Program

3.4.2.1.12 Main Steam System

Materials

The materials of construction for the Main Steam System components are:

- Aluminum or Aluminum Alloys
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel
- Copper and Copper Alloys
- Insulation
- Stainless Steel

Environment

The Main Steam System components are exposed to the following:

- Air - Indoor Uncontrolled
- Dried Air
- Dry Gas
- Steam
- Treated Water

Aging Effects Requiring Management

The following Main Steam System aging effects require management:

- Cracking
- Cumulative Fatigue Damage

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Main Steam System components:
- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Flow-Accelerated Corrosion Program
- One-Time Inspection Program
- Water Chemistry Program

3.4.2.1.13 Relief Valve Vent System

Materials

The materials of construction for the Relief Valve Vent System components are:
- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel

Environment

The Relief Valve Vent System components are exposed to the following:
- Air - Indoor Uncontrolled
- Air - Outdoor

Aging Effects Requiring Management

The following Relief Valve Vent System aging effects require management:
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Relief Valve Vent System components:
- Bolting Integrity Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.4.2.1.14 Secondary Plant System

Materials

The materials of construction for the Secondary Plant System components are:

- Stainless Steel

Environment

The Secondary Plant System components are exposed to the following:

- Air - Indoor Uncontrolled
- Treated Water

Aging Effects Requiring Management

The following Secondary Plant System aging effects require management:

- Cracking
- Cumulative Fatigue Damage
- Loss of Material

Aging Management Programs

The following AMPs manage the aging effects for the Secondary Plant System components:

- One-Time Inspection Program
- Water Chemistry Program

3.4.2.1.15 Cycle Startup System

Materials

The materials of construction for the Cycle Startup System components are:

- Bolting (Carbon or Low Alloy Steel / Stainless Steel)
- Carbon or Low Alloy Steel

Environment

The Cycle Startup System components are exposed to the following:

- Air - Indoor Uncontrolled
- Treated Water

Aging Effects Requiring Management

The following Cycle Startup System aging effects require management:

- Cumulative Fatigue Damage
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Cycle Startup System components:

- Bolting Integrity Program
- External Surfaces Monitoring Program
- One-Time Inspection Program
- Water Chemistry Program

3.4.2.2 Further Evaluation of Aging Management as Recommended by NUREG-1801

NUREG-1801 identifies aging management activities that warrant further evaluation. For the Steam and Power Conversion Systems, those activities are addressed in the following subsections.

3.4.2.2.1 Cumulative Fatigue Damage

Fatigue is a TLAA as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c)(1). The evaluation of this TLAA is addressed separately in Section 4.3.

3.4.2.2.2 Loss of Material Due to General, Pitting, and Crevice Corrosion

3.4.2.2.2.1 Steam and Power Conversion System Piping, Piping Components and Piping Elements Exposed to Treated Water

Item 3.4.1-03 is not applicable to CR-3. The steam generator blowdown components in the Main Steam System do not contain in-scope heat exchanger components with this material environment combination. Loss of material due to general, pitting, and crevice corrosion could occur for steel piping, piping components, piping elements, and tanks exposed to treated water and for steel piping, piping components, and piping elements exposed to steam. CR-3 manages piping components exposed to treated water with a combination of the Water Chemistry and the One-Time Inspection Programs. The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the prevention or mitigation of the cracking and loss of material aging effects. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.4.2.2.2.2 Steam and Power Conversion System Piping, Piping Components, and Piping Elements Exposed to Lubricating Oil

CR-3 manages piping components exposed to lubricating oil with a combination of the Lubricating Oil Analysis Program and the One-Time Inspection Program. The Lubricating Oil Analysis Program maintains oil systems contaminants (primarily water and particulates) within acceptable limits; thereby preserving an environment that is not conducive to loss of material, cracking or reduction of heat transfer. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.4.2.2.3 Steam and Power Conversion System Piping, Piping Components, and Piping Elements Exposed to Raw Water

Loss of material due to general, pitting, crevice, and MIC, and fouling could occur in steel piping, piping components, and piping elements exposed to raw water. For CR-3, the Emergency Feedwater System and portions of the Feedwater System providing the auxiliary feedwater function are not exposed to raw water. Therefore, aging effect and mechanism are not applicable.

3.4.2.2.4 Reduction of Heat Transfer Due to Fouling

3.4.2.2.4.1 Steam and Power Conversion System Heat Exchanger Components exposed to Treated Water

Reduction of heat transfer due to fouling could occur for heat exchanger tubes exposed to treated water. CR-3 manages heat exchanger components exposed to treated water with a combination of the Water Chemistry Program and the One-Time Inspection Program. The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the prevention or mitigation of the cracking and loss of material aging effects. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.4.2.2.4.2 Steam and Power Conversion System Heat Exchanger Components Exposed to Lubricating Oil

Reduction of heat transfer due to fouling could occur for heat exchanger tubes exposed to lubricating oil. CR-3 manages heat exchanger components exposed to lubricating oil with the Lubricating Oil Analysis Program and the One-Time Inspection Program. The Lubricating Oil Analysis Program maintains oil systems contaminants (primarily water and particulates) within acceptable limits, thereby preserving an environment that is not conducive to loss of material, cracking or reduction of heat transfer. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.4.2.2.5 Loss of Material Due to General, Pitting, Crevice, and Microbiologically-Influenced Corrosion

3.4.2.2.5.1 External Surfaces of Steel Piping, Piping Components, and Piping Elements Exposed to Soil

Loss of material due to general, pitting and crevice corrosion, and MIC could occur in steel piping, piping components, piping elements and tanks exposed to soil in buried portions of the Condensate System. The Buried Piping and Tanks Inspection Program relies on industry practice, frequency of pipe excavation, and operating experience to manage the effects of loss of material from general corrosion, pitting and crevice corrosion, and MIC.

3.4.2.2.5.2 Auxiliary Feedwater System Heat Exchanger Components Exposed to Lubricating Oil

This item is not applicable to CR-3. Emergency Feedwater System heat exchanger components, and Feedwater System components performing the auxiliary feedwater function exposed to lubricating oil are not constructed of steel.

3.4.2.2.6 Steam and Power Conversion System Stainless Steel Piping, Piping Components, and Piping Elements exposed to Treated Water

Table 3.4.1, Item 3.4.1-13 relates to BWR systems, and is not applicable to CR-3. Cracking due to Stress Corrosion Cracking (SCC) could occur in stainless steel piping, piping components, and piping elements, tanks, and heat exchanger components exposed to steam or treated water with a temperature greater than 140°F. CR-3 manages stainless steel piping components exposed to treated water with a combination of the Water Chemistry Program and the One-Time Inspection Program. The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the prevention or mitigation of the cracking and loss of material aging effects. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.4.2.2.7 Loss of Material Due to Pitting and Crevice Corrosion

3.4.2.2.7.1 Steam and Power Conversion System Piping, Piping Components and Piping Elements Exposed to Treated Water

CR-3 manages piping components exposed to treated water with a combination of the Water Chemistry Program and the One-Time Inspection Program. The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the prevention or mitigation of the cracking and loss of material aging effects. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.4.2.2.7.2 External Surfaces of Stainless Steel Piping, Piping Components, and Piping Elements Exposed to Soil

For CR-3, the Condensate Systems, Emergency Feedwater System, and portions of the Feedwater System associated with the auxiliary feedwater function do not contain stainless steel components exposed to soil. Therefore, this item is not applicable to CR-3.

3.4.2.2.7.3 Steam and Power Conversion System Copper Alloy Piping, Piping Components, and Piping Elements Exposed to Lubricating Oil

Loss of material due to pitting and crevice corrosion could occur for copper alloy piping, piping components, and piping elements exposed to lubricating oil. CR-3 manages piping components exposed to lubricating oil with the Lubricating Oil Analysis Program and the One-Time Inspection Program. The Lubricating Oil Analysis Program maintains oil systems contaminants (primarily water and particulates) within acceptable limits, thereby preserving an environment that is not conducive to loss of material, cracking or reduction of heat transfer. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.4.2.2.8 Steam and Power Conversion System Stainless Steel Piping, Piping Components, and Piping Elements and Heat Exchanger Components Exposed to Lubricating Oil

Loss of material due to pitting and crevice corrosion could occur in stainless steel piping, piping components, piping elements, and heat exchanger components exposed to lubricating oil. The CR-3 methodology does not predict MIC in lubricating oil systems unless indicated by operating experience. CR-3 manages Steam and Power Conversion System stainless steel piping and heat exchanger components exposed to lubricating oil with a combination of the Lubricating Oil Analysis Program and the One-Time Inspection Program. The Lubricating Oil Analysis Program maintains oil systems contaminants (primarily water and particulates) within acceptable limits, thereby preserving an environment that is not conducive to loss of material (including loss of material caused by MIC), cracking, or reduction of heat transfer. In addition, the One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.4.2.2.9 Condensate System Heat Exchanger Components exposed to Treated Water

This item is not applicable to CR-3. NUREG-1801 Unique Item VIII.E-7 is applicable to BWR plants only.

3.4.2.2.10 Quality Assurance for Aging Management of Non-Safety Related Components

QA provisions applicable to License Renewal are discussed in Section B.1.3.

3.4.2.3 Time-Limited Aging Analysis

The Time-Limited Aging Analyses (TLAA) identified below are associated with the Steam and Power Conversion System components. The subsection of the application that contains the TLAA review results is indicated in parenthesis.

1. Metal Fatigue (Section 4.3)

3.4.3 CONCLUSIONS

The Steam and Power Conversion Systems components/commodities having aging effects requiring management have been evaluated, and aging management programs have been selected to manage the aging effects. A description of the aging management programs is provided in Appendix B, along with a demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the demonstration provided in Appendix B, the effects of aging will be adequately managed so that there is reasonable assurance that the intended functions of Steam and Power Conversion Systems components/commodities will be maintained consistent with the current licensing basis during the period of extended operation.

TABLE 3.4.1 SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VIII OF NUREG-1801 FOR STEAM AND POWER CONVERSION SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1-01	Steel piping, piping components, and piping elements exposed to steam or treated water	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue of metal components is addressed as a TLAA. Further evaluation is documented in Subsection 3.4.2.2.1.
3.4.1-02	Steel piping, piping components, and piping elements exposed to steam	Loss of material due to general, pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. CR-3 manages the aging effect with a combination of Water Chemistry Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.4.2.2.2.1.
3.4.1-03	Steel heat exchanger components exposed to treated water	Loss of material due to general, pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	This item is not applicable. The portions of the Condensate System and the Steam Generator Blowdown System within the scope of license renewal do not contain heat exchanger components. Further evaluation is documented in Subsection 3.4.2.2.2.1.
3.4.1-04	Steel piping, piping components, and piping elements exposed to treated water	Loss of material due to general, pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. CR-3 manages the aging effect with a combination of the Water Chemistry Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.4.2.2.2.1.

TABLE 3.4.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VIII OF NUREG-1801 FOR STEAM AND POWER CONVERSION SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1-05	BWR Only				
3.4.1-06	Steel and stainless steel tanks exposed to treated water	Loss of material due to general (steel only) pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. CR-3 manages the aging effect with a combination of the Water Chemistry Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.4.2.2.7.1.
3.4.1-07	Steel piping, piping components, and piping elements exposed to lubricating oil	Loss of material due to general, pitting and crevice corrosion	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. CR-3 manages the aging effect with a combination of the Lubricating Oil Analysis Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.4.2.2.2.2.
3.4.1-08	Steel piping, piping components, and piping elements exposed to raw water	Loss of material due to general, pitting, crevice, and microbiological-ly-influenced corrosion, and fouling	Plant specific	Yes, plant specific	This item is not applicable to CR-3. The Emergency Feedwater System and portions of the Feedwater System performing the auxiliary feedwater function within the scope of license renewal are not exposed to raw water.

TABLE 3.4.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VIII OF NUREG-1801 FOR STEAM AND POWER CONVERSION SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1-09	Stainless steel and copper alloy heat exchanger tubes exposed to treated water	Reduction of heat transfer due to fouling	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. CR-3 manages the aging effect with a combination of the Water Chemistry Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.4.2.2.4.1.
3.4.1-10	Steel, stainless steel, and copper alloy heat exchanger tubes exposed to lubricating oil	Reduction of heat transfer due to fouling	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. CR-3 manages the aging effect with a combination of the Lubricating Oil Analysis Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.4.2.2.4.2.
3.4.1-11	Buried steel piping, piping components, piping elements, and tanks (with or without coating or wrapping) exposed to soil	Loss of material due to general, pitting, crevice, and microbiological-ly-influenced corrosion	Buried Piping and Tanks Surveillance or Buried Piping and Tanks Inspection	No Yes, detection of aging effects and operating experience are to be further evaluated	Consistent with NUREG-1801. CR-3 manages the aging effect with the Buried Piping and Tanks Inspection Program. Further evaluation is documented in Subsection 3.4.2.2.5.1.
3.4.1-12	Steel heat exchanger components exposed to lubricating oil	Loss of material due to general, pitting, crevice and microbiological-ly-influenced corrosion	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	This item is not applicable. Further evaluation is documented in Subsection 3.4.2.2.5.2.

TABLE 3.4.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VIII OF NUREG-1801 FOR STEAM AND POWER CONVERSION SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1-13	BWR Only				
3.4.1-14	Stainless steel piping, piping components, piping elements, tanks, and heat exchanger components exposed to treated water >60°C (>140°F)	Cracking due to stress corrosion cracking	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. CR-3 manages the aging effect with a combination of the Water Chemistry Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.4.2.2.6.
3.4.1-15	Aluminum and copper alloy piping, piping components, and piping elements exposed to treated water	Loss of material due to pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. CR-3 manages the aging effect with a combination of the Water Chemistry Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.4.2.2.7.1.
3.4.1-16	Stainless steel piping, piping components, and piping elements; tanks, and heat exchanger components exposed to treated water	Loss of material due to pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. CR-3 manages the aging effect with a combination of the Water Chemistry Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.4.2.2.7.1.
3.4.1-17	Stainless steel piping, piping components, and piping elements exposed to soil	Loss of material due to pitting and crevice corrosion	Plant specific	Yes, plant specific	This item is not applicable to CR-3. The components in the Feedwater System providing the auxiliary feedwater function and the Condensate System do not contain stainless steel exposed to soil. Further evaluation is documented in Subsection 3.4.2.2.7.2.

TABLE 3.4.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VIII OF NUREG-1801 FOR STEAM AND POWER CONVERSION SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1-18	Copper alloy piping, piping components, and piping elements exposed to lubricating oil	Loss of material due to pitting and crevice corrosion	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. CR-3 manages the aging effect with a combination of the Lubricating Oil Analysis Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.4.2.2.7.3.
3.4.1-19	Stainless steel piping, piping components, piping elements, and heat exchanger components exposed to lubricating oil	Loss of material due to pitting, crevice, and microbiological-ly-influenced corrosion	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. CR-3 manages the aging effects with a combination of the Lubricating Oil Analysis Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.4.2.2.8.
3.4.1-20	Steel tanks exposed to air – outdoor (external)	Loss of material/ general, pitting, and crevice corrosion	Aboveground Steel Tanks	No	Consistent with NUREG-1801. CR-3 manages the aging effect with the Aboveground Steel Tanks Program.
3.4.1-21	High-strength steel closure bolting exposed to air with steam or water leakage	Cracking due to cyclic loading, stress corrosion cracking	Bolting Integrity	No	This item is not applicable. The Steam and Power Conversion Systems do not contain high-strength steel closure bolting.

TABLE 3.4.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VIII OF NUREG-1801 FOR STEAM AND POWER CONVERSION SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1-22	Steel bolting and closure bolting exposed to air with steam or water leakage, air – outdoor (external), or air – indoor uncontrolled (external);	Loss of material due to general, pitting and crevice corrosion; loss of preload due to thermal effects, gasket creep, and self-loosening	Bolting Integrity	No	Consistent with NUREG-1801. The aging effect is managed by the Bolting Integrity Program.
3.4.1-23	Stainless steel piping, piping components, and piping elements exposed to closed-cycle cooling water >60°C (>140°F)	Cracking due to stress corrosion cracking	Closed-Cycle Cooling Water System	No	The aging effect is managed by the Closed-Cycle Cooling Water System Program.
3.4.1-24	Steel heat exchanger components exposed to closed cycle cooling water	Loss of material due to general, pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System	No	The aging effect is managed by the Closed-Cycle Cooling Water System Program.
3.4.1-25	Stainless steel piping, piping components, piping elements, and heat exchanger components exposed to closed cycle cooling water	Loss of material due to pitting and crevice corrosion	Closed-Cycle Cooling Water System	No	The aging effect is managed by the Closed-Cycle Cooling Water System Program.

TABLE 3.4.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VIII OF NUREG-1801 FOR STEAM AND POWER CONVERSION SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1-26	Copper alloy piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System	No	This item is not applicable to the Steam and Power Conversion Systems at CR-3.
3.4.1-27	Steel, stainless steel, and copper alloy heat exchanger tubes exposed to closed cycle cooling water	Reduction of heat transfer due to fouling	Closed-Cycle Cooling Water System	No	The aging effect is managed by the Closed-Cycle Cooling Water System Program.
3.4.1-28	Steel external surfaces exposed to air – indoor uncontrolled (external), condensation (external), or air outdoor (external)	Loss of material due to general corrosion	External Surfaces Monitoring	No	Consistent with NUREG-1801. The aging effect is managed by the External Surfaces Monitoring Program.
3.4.1-29	Steel piping, piping components, and piping elements exposed to steam or treated water	Wall thinning due to flow-accelerated corrosion	Flow-Accelerated Corrosion	No	Consistent with NUREG-1801. The aging effect is managed by the Flow-Accelerated Corrosion Program.
3.4.1-30	Steel piping, piping components, and piping elements exposed to air outdoor (internal) or condensation (internal)	Loss of material due to general, pitting, and crevice corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	No	Consistent with NUREG-1801. The aging effect is managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program.

TABLE 3.4.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VIII OF NUREG-1801 FOR STEAM AND POWER CONVERSION SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1-31	Steel heat exchanger components exposed to raw water	Loss of material due to general, pitting, crevice, galvanic, and microbiological-ly-influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	This item is not applicable to the Steam and Power Conversion Systems at CR-3.
3.4.1-32	Stainless steel and copper alloy piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting, crevice, and microbiological-ly-influenced corrosion	Open-Cycle Cooling Water System	No	This item is not applicable to the Steam and Power Conversion Systems at CR-3.
3.4.1-33	Stainless steel heat exchanger components exposed to raw water	Loss of material due to pitting, crevice, and microbiological-ly-influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	This item is not applicable to the Steam and Power Conversion Systems at CR-3.
3.4.1-34	Steel, stainless steel, and copper alloy heat exchanger tubes exposed to raw water	Reduction of heat transfer due to fouling	Open-Cycle Cooling Water System	No	This item is not applicable to the Steam and Power Conversion Systems at CR-3.

TABLE 3.4.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VIII OF NUREG-1801 FOR STEAM AND POWER CONVERSION SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1-35	Copper alloy >15% Zn piping, piping components, and piping elements exposed to closed cycle cooling water, raw water, or treated water	Loss of material due to selective leaching	Selective Leaching of Materials	No	The aging effect is managed for susceptible components with the Selective Leaching of Materials Program.
3.4.1-36	Gray cast iron piping, piping components, and piping elements exposed to soil, treated water, or raw water	Loss of material due to selective leaching	Selective Leaching of Materials	No	The aging effect is managed for susceptible components with the Selective Leaching of Materials Program.
3.4.1-37	Steel, stainless steel, and nickel-based alloy piping, piping components, and piping elements exposed to steam	Loss of material due to pitting and crevice corrosion	Water Chemistry	No	Consistent with NUREG-1801. The aging effect is managed by the Water Chemistry Program.
3.4.1-38	Steel bolting and external surfaces exposed to air with borated water leakage	Loss of material due to boric acid corrosion	Boric Acid Corrosion	No	Consistent with NUREG-1801. The aging effect is managed by the Boric Acid Corrosion Program.
3.4.1-39	Stainless steel piping, piping components, and piping elements exposed to steam	Cracking due to stress corrosion cracking	Water Chemistry	No	Consistent with NUREG-1801. The aging effect is managed by the Water Chemistry Program.
3.4.1-40	Glass piping elements exposed to air, lubricating oil, raw water, and treated water	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.4.1-41	Stainless steel, copper alloy, and nickel alloy piping, piping components, and piping elements exposed to air – indoor uncontrolled (external)	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.

TABLE 3.4.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VIII OF NUREG-1801 FOR STEAM AND POWER CONVERSION SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1-42	Steel piping, piping components, and piping elements exposed to air – indoor controlled (external)	None	None	NA - No AEM or AMP	This item is not applicable to CR-3. The CR-3 AMR methodology evaluated all indoor air (included controlled air), as an Air - Indoor Uncontrolled environment.
3.4.1-43	Steel and stainless steel piping, piping components, and piping elements in concrete	None	None	NA - No AEM or AMP	This item is not applicable to CR-3.
3.4.1-44	Steel, stainless steel, aluminum, and copper alloy piping, piping components, and piping elements exposed to gas	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.

TABLE 3.4.2-1 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONDENSER AIR REMOVAL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	Bolting Integrity	VIII.H-6 (S-02)	3.4.1-22	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VIII.H-5 (S-33)	3.4.1-22	A
Condenser Vacuum Pump Heat Exchanger	M-1	Stainless Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.E-24 (SP-39)	3.4.1-25	D
				Cracking due to SCC	Closed-Cycle Cooling Water System	VIII.E-25 (SP-54)	3.4.1-23	D
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 402
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Condenser Vacuum Pump Heat Exchanger Heat Transfer Surfaces	M-5	Stainless Steel	Raw Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 402
			Closed Cycle Cooling Water (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-3 (AP-63)	3.3.1-52	D

TABLE 3.4.2-1 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONDENSER AIR REMOVAL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-2 (EP-3)	3.2.1-50	C
		Carbon or Low Alloy Steel	Raw Water (Inside)	Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VIII.B1-7 (SP-60)	3.4.1-30	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A
		Copper and Copper Alloys	Raw Water (Inside)	Cracking due to SCC Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C1-10 (A-47)	3.3.1-84	D

TABLE 3.4.2-1 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONDENSER AIR REMOVAL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Copper and Copper Alloys	Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	A
		Glass	Raw Water (Inside)	None	None	VIII.I-7 (SP-34)	3.4.1-40	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-5 (SP-9)	3.4.1-40	A
		Gray Cast Iron	Raw Water (Inside)	Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VIII.B1-7 (SP-60)	3.4.1-30	C
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VIII.G-24 (SP-28)	3.4.1-36	D
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A

TABLE 3.4.2-1 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONDENSER AIR REMOVAL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	PVC or Thermo-plastics	Raw Water (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring			J
		Stainless Steel	Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	C
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A

TABLE 3.4.2-2 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY STEAM SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VIII.H-5 (S-33)	3.4.1-22	A
				Loss of Material due to General Corrosion	Bolting Integrity	VIII.H-4 (S-34)	3.4.1-22	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-2 (S-40)	3.4.1-38	A
Piping Insulation	M-6	Insulation	Air - Indoor Uncontrolled (Outside)	None	None			J
Piping, piping components, piping elements, and tanks	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	A
		Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VIII.B1-7 (SP-60)	3.4.1-30	A
			Steam (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VIII.B1-8 (S-07)	3.4.1-37	A
				Loss of Material due to General Corrosion	Water Chemistry	VIII.B1-8 (S-07)		H

TABLE 3.4.2-2 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY STEAM SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Carbon or Low Alloy Steel	Steam (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.B1-10 (S-08)	3.4.1-01	A
			Treated Water (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.B1-10 (S-08)	3.4.1-01	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.B1-11 (S-10)	3.4.1-04	A
				Loss of Material due to FAC	Flow-Accelerated Corrosion	VIII.F-26 (S-16)	3.4.1-29	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A
		Copper and Copper Alloys	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 401
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J, 401
			Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A

TABLE 3.4.2-2 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY STEAM SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Glass	Air - Indoor Uncontrolled (Inside)	None	None	VIII.I-5 (SP-9)	3.4.1-40	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-5 (SP-9)	3.4.1-40	A
		Gray Cast Iron	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VIII.B1-7 (SP-60)	3.4.1-30	A, 401
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VIII.B1-7 (SP-60)		H, 401
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A

TABLE 3.4.2-2 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY STEAM SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Stainless Steel	Air - Indoor Uncontrolled (Inside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A, 401
			Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	C
			Steam (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VIII.B1-3 (SP-43)	3.4.1-37	A
				Cracking due to SCC	Water Chemistry	VIII.B1-2 (SP-44)	3.4.1-39	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A

TABLE 3.4.2-3 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONDENSATE SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VIII.H-5 (S-33)	3.4.1-22	A
				Loss of Material due to General Corrosion	Bolting Integrity	VIII.H-4 (S-34)	3.4.1-22	A
			Air - Outdoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VIII.H-1 (S-32)	3.4.1-22	A
Condensate Pumps	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-34 (S-10)	3.4.1-04	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A

TABLE 3.4.2-3 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONDENSATE SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Condensate Pumps (continued)	M-1	Gray Cast Iron	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-34 (S-10)	3.4.1-04	A
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VIII.E-23 (SP-27)	3.4.1-36	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
Condensate Storage Tank	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-40 (S-13)	3.4.1-06	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Aboveground Carbon Steel Tanks	VIII.E-39 (S-31)	3.4.1-20	A
Condenser Hotwell Strainer	M-2	Stainless Steel	Treated Water (Outside)	Flow Blockage due to Fouling	Water Chemistry and One-Time Inspection			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-29 (SP-16)	3.4.1-16	A

TABLE 3.4.2-3 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONDENSATE SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Expansion Joints	M-1	Elastomers	Treated Water (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation Loss of Material due to Wear	External Surfaces Monitoring			J
			Air - Outdoor (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation Loss of Material due to Wear	External Surfaces Monitoring			J
LP Feedwater Heaters	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Galvanic Corrosion	Water Chemistry and One-Time Inspection			J
				Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.B1-10 (S-08)	3.4.1-01	C
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-34 (S-10)	3.4.1-04	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A

TABLE 3.4.2-3 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONDENSATE SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
LP Feedwater Heaters (continued)	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-29 (SP-16)	3.4.1-16	C
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.E-30 (SP-17)	3.4.1-14	C
			Steam (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Cracking due to SCC Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection			J
Main Condenser	M-1	Carbon or Low Alloy Steel	Steam (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.A-16 (S-06)	3.4.1-02	C
			Treated Water (Inside)	Loss of Material due to Galvanic Corrosion	Water Chemistry and One-Time Inspection			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-34 (S-10)	3.4.1-04	C

TABLE 3.4.2-3 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONDENSATE SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Main Condenser (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
		Stainless Steel	Steam (Inside)	Cracking due to SCC Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection			J
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-29 (SP-16)	3.4.1-16	C
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	C
		Titanium	Raw Water (Inside)	Cracking due to SCC Flow Blockage due to Fouling	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Treated Water (Outside)	Cracking due to SCC Loss of Material due to Crevice Corrosion	Water Chemistry and One-Time Inspection			J

TABLE 3.4.2-3 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONDENSATE SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Main Condenser Tubes	M-5	Titanium	Raw Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Treated Water (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Water Chemistry and One-Time Inspection			J
Piping, piping components, piping elements, and tanks	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-2 (EP-3)	3.2.1-50	C
		Carbon or Low Alloy Steel	Treated Water (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.B1-10 (S-08)	3.4.1-01	C
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-34 (S-10)	3.4.1-04	C
				Loss of Material due to Galvanic Corrosion	Water Chemistry and One-Time Inspection	VIII.E-34 (S-10)		H
				Loss of Material due to FAC	Flow-Accelerated Corrosion	VIII.E-35 (S-16)	3.4.1-29	A

TABLE 3.4.2-3 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONDENSATE SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
			Air - Outdoor (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-8 (S-41)	3.4.1-28	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VIII.H-8 (S-41)		H
			Soil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Buried Piping and Tanks Inspection	VIII.E-1 (S-01)	3.4.1-11	A
				Loss of Material due to Galvanic Corrosion	Buried Piping and Tanks Inspection	VIII.E-1 (S-01)		H

TABLE 3.4.2-3 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONDENSATE SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	C
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	A
		Fiber Glass or Fiber Reinforced Plastic	Treated Water (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Outdoor (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation	External Surfaces Monitoring			J
		Glass	Treated Water (Inside)	None	None	VIII.I-8 (SP-35)	3.4.1-40	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-4 (SP-33)	3.4.1-40	A

TABLE 3.4.2-3 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONDENSATE SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Stainless Steel	Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	C
			Treated Water (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-29 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.E-30 (SP-17)	3.4.1-14	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J

TABLE 3.4.2-4 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – OTSG CHEMICAL CLEANING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	A
				Loss of Material due to General Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	A
Containment Isolation Piping and Components	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.4.2-4 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – OTSG CHEMICAL CLEANING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	C
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-8 (S-10)	3.4.1-04	C
				Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.D1-7 (S-11)	3.4.1-01	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.4.2-4 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – OTSG CHEMICAL CLEANING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Glass	Treated Water (Inside)	None	None	VII.J-13 (AP-51)	3.3.1-93	A
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
		Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.4.2-5 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CD & FW CHEMICAL CLEANING SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VIII.H-5 (S-33)	3.4.1-22	A
				Loss of Material due to General Corrosion	Bolting Integrity	VIII.H-4 (S-34)	3.4.1-22	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-2 (S-40)	3.4.1-38	A
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Dry Gas (Inside)	None	None	VIII.I-15 (SP-4)	3.4.1-44	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A

TABLE 3.4.2-6 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONDENSATE DEMINERALIZER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VIII.H-5 (S-33)	3.4.1-22	A
				Loss of Material due to General Corrosion	Bolting Integrity	VIII.H-4 (S-34)	3.4.1-22	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-2 (S-40)	3.4.1-38	A
Flow restricting elements	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-34 (S-10)	3.4.1-04	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
		Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-29 (SP-16)	3.4.1-16	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
	M-3	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-29 (SP-16)	3.4.1-16	A

TABLE 3.4.2-6 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONDENSATE DEMINERALIZER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-2 (EP-3)	3.2.1-50	C
		Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-34 (S-10)	3.4.1-04	A
				Loss of Material due to Galvanic Corrosion	Water Chemistry and One-Time Inspection	VIII.E-34 (S-10)		H
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
		Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	C
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	A
		Glass	Treated Water (Inside)	None	None	VIII.I-8 (SP-35)	3.4.1-40	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-4 (SP-33)	3.4.1-40	A

TABLE 3.4.2-6 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONDENSATE DEMINERALIZER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	C
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-29 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.E-30 (SP-17)	3.4.1-14	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A

TABLE 3.4.2-7 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VIII.H-5 (S-33)	3.4.1-22	A
				Loss of Material due to General Corrosion	Bolting Integrity	VIII.H-4 (S-34)	3.4.1-22	A
			Air - Outdoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VIII.H-1 (S-32)	3.4.1-22	A
Motor Driven Emergency Feedwater Pump	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-38 (S-10)	3.4.1-04	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A

TABLE 3.4.2-7 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Motor Driven Emergency Feedwater Pump Motor Cooler Components	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	C
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A

TABLE 3.4.2-7 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Motor Driven Emergency Feedwater Pump Motor Cooler Components (continued)	M-1	Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	D
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
			Raw Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials			J

TABLE 3.4.2-7 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Motor Driven Emergency Feedwater Pump Motor Cooler Tubes	M-5	Aluminum or Aluminum Alloys	Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
		Copper and Copper Alloys	Closed Cycle Cooling Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	D
			Air - Indoor Uncontrolled (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
Motor Driven Emergency Feedwater Pump Gear Oil Cooler Components	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VIII.G-5 (S-23)	3.4.1-24	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A

TABLE 3.4.2-7 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Motor Driven Emergency Feedwater Pump Gear Oil Cooler Components (continued)	M-1	Stainless Steel	Lubricating Oil (Inside)	Cracking due to SCC	Lubricating Oil Analysis and One-Time Inspection			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VIII.G-3 (S-20)	3.4.1-19	A
			Closed Cycle Cooling Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VIII.G-2 (S-25)	3.4.1-25	B
				Cracking due to SCC	Closed-Cycle Cooling Water System	VIII.G-2 (S-25)		H
Motor Driven Emergency Feedwater Pump Gear Oil Cooler Tubes	M-5	Stainless Steel	Lubricating Oil (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Lubricating Oil Analysis and One-Time Inspection	VIII.G-12 (SP-62)	3.4.1-10	A
			Closed Cycle Cooling Water (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VIII.G-11 (SP-41)	3.4.1-27	B

TABLE 3.4.2-7 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Turbine Driven Emergency Feedwater Pump	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-38 (S-10)	3.4.1-04	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
Turbine Driven Emergency Feedwater Pump Turbine	M-1	Carbon or Low Alloy Steel	Steam (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.B1-10 (S-08)	3.4.1-01	C
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.A-16 (S-06)	3.4.1-02	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A

TABLE 3.4.2-7 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Turbine Driven Emergency Feedwater Pump Turbine Governor Lube Oil Cooler Components	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Galvanic Corrosion	Water Chemistry and One-Time Inspection			J
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-38 (S-10)	3.4.1-04	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
		Stainless Steel	Lubricating Oil (Inside)	Cracking due to SCC	Lubricating Oil Analysis and One-Time Inspection			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VIII.G-3 (S-20)	3.4.1-19	A
			Treated Water (Outside)	Cracking due to SCC	Water Chemistry and One-Time Inspection			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-32 (SP-16)	3.4.1-16	C

TABLE 3.4.2-7 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Turbine Driven Emergency Feedwater Pump Turbine Governor Lube Oil Cooler Tubes	M-5	Stainless Steel	Lubricating Oil (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Lubricating Oil Analysis and One-Time Inspection	VIII.G-12 (SP-62)	3.4.1-10	A
			Treated Water (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Water Chemistry and One-Time Inspection	VIII.E-13 (SP-40)	3.4.1-09	C
Motor and Turbine Driven Emergency Feedwater Pump Cavitating Venturis	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-32 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.G-33 (SP-17)	3.4.1-14	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
	M-3	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-32 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.G-33 (SP-17)	3.4.1-14	A

TABLE 3.4.2-7 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Diesel Driven Emergency Feedwater Pump	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-38 (S-10)	3.4.1-04	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
Diesel Driven Emergency Feedwater Pump Cavitating Venturi	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-32 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.G-33 (SP-17)	3.4.1-14	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
	M-3	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-32 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.G-33 (SP-17)	3.4.1-14	A

TABLE 3.4.2-7 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Diesel Driven Emergency Feedwater Pump Recirculation Flow Elements	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-32 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.G-33 (SP-17)	3.4.1-14	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
	M-3	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-32 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.G-33 (SP-17)	3.4.1-14	A
Diesel Driven Emergency Feedwater Pump Recirculation Orifices	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-38 (S-10)	3.4.1-04	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A

TABLE 3.4.2-7 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Diesel Driven Emergency Feedwater Pump Recirculation Orifices (continued)	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-32 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.G-33 (SP-17)	3.4.1-14	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
	M-3	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-32 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.G-33 (SP-17)	3.4.1-14	A
Emergency Feedwater Tank	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-38 (S-10)	3.4.1-04	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A

TABLE 3.4.2-7 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting elements	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-38 (S-10)	3.4.1-04	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
		Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-32 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.G-33 (SP-17)	3.4.1-14	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
	M-3	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-32 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.G-33 (SP-17)	3.4.1-14	A

TABLE 3.4.2-7 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping Insulation	M-6	Insulation	Air - Indoor Uncontrolled (Outside)	None	None			J
			Air - Outdoor (Outside)	None	None			J
Piping, piping components, piping elements, and tanks	M-1	Carbon or Low Alloy Steel	Air - Outdoor (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VIII.G-34 (SP-60)	3.4.1-30	A
			Dry Gas (Inside)	None	None	VIII.I-15 (SP-4)	3.4.1-44	A
			Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VIII.G-35 (SP-25)	3.4.1-07	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-38 (S-10)	3.4.1-04	A

TABLE 3.4.2-7 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C
				Loss of Material due to Galvanic Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)		H
			Soil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Buried Piping and Tanks Inspection	VIII.G-1 (S-01)	3.4.1-11	A
				Loss of Material due to Galvanic Corrosion	Buried Piping and Tanks Inspection	VIII.G-1 (S-01)		H

TABLE 3.4.2-7 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Elastomers	Air - Outdoor (Inside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor Uncontrolled (Outside)	Hardening and Loss of Strength due to Elastomer/ Plastic degradation Loss of Material due to Wear	External Surfaces Monitoring			J
		Glass	Lubricating Oil (Inside)	None	None	VIII.I-6 (SP-10)	3.4.1-40	A
			Treated Water (Inside)	None	None	VIII.I-8 (SP-35)	3.4.1-40	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-4 (SP-33)	3.4.1-40	A

TABLE 3.4.2-7 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Stainless Steel	Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	C
			Dry Gas (Inside)	None	None	VIII.I-12 (SP-15)	3.4.1-44	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-32 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.G-33 (SP-17)	3.4.1-14	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A

TABLE 3.4.2-8 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Auxiliary Feedwater Pump	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-8 (S-10)	3.4.1-04	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
Auxiliary Feedwater Pump Bearing Cooler Housing & Components	M-1	Carbon or Low Alloy Steel	Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VIII.D1-6 (SP-25)	3.4.1-07	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
		Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)	3.4.1-16	C
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.D1-5 (SP-17)	3.4.1-14	C

TABLE 3.4.2-8 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Auxiliary Feedwater Pump Bearing Cooler Housing & Components (continued)	M-1	Stainless Steel	Lubricating Oil (Outside)	Cracking due to SCC	Lubricating Oil Analysis and One-Time Inspection			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VIII.D1-3 (SP-38)	3.4.1-19	C
Auxiliary Feedwater Pump Bearing Coolers Tubes	M-5	Copper and Copper Alloys	Lubricating Oil (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Lubricating Oil Analysis and One-Time Inspection	VIII.G-8 (SP-53)	3.4.1-10	C
		Stainless Steel	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Water Chemistry and One-Time Inspection	VIII.E-13 (SP-40)	3.4.1-09	C
			Lubricating Oil (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Lubricating Oil Analysis and One-Time Inspection	VIII.G-12 (SP-62)	3.4.1-10	C
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VIII.H-5 (S-33)	3.4.1-22	A
				Loss of Material due to General Corrosion	Bolting Integrity	VIII.H-4 (S-34)	3.4.1-22	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-2 (S-40)	3.4.1-38	A

TABLE 3.4.2-8 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment Isolation Piping and Components	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-8 (S-10)	3.4.1-04	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.D1-7 (S-11)	3.4.1-01	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A
Deaerator	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-8 (S-10)	3.4.1-04	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.D1-7 (S-11)	3.4.1-01	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A

TABLE 3.4.2-8 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Feedwater Booster Pumps	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-8 (S-10)	3.4.1-04	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.D1-7 (S-11)	3.4.1-01	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
Feedwater Booster Pumps Lube Oil Pumps	M-1	Carbon or Low Alloy Steel	Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VIII.D1-6 (SP-25)	3.4.1-07	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A

TABLE 3.4.2-8 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Feedwater Heaters	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-8 (S-10)	3.4.1-04	C
				Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.D1-7 (S-11)	3.4.1-01	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
		Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)	3.4.1-16	C
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.D1-5 (SP-17)	3.4.1-14	C
			Steam (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Cracking due to SCC Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection			J

TABLE 3.4.2-8 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting elements	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-8 (S-10)	3.4.1-04	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.D1-7 (S-11)	3.4.1-01	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
		Stainless Steel	Treated Water (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.D1-5 (SP-17)	3.4.1-14	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A

TABLE 3.4.2-8 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting elements (continued)	M-3	Stainless Steel	Treated Water (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.D1-5 (SP-17)	3.4.1-14	A
Flow restricting orifice housing/ plates	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-8 (S-10)	3.4.1-04	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.D1-7 (S-11)	3.4.1-01	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A

TABLE 3.4.2-8 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting orifice housing/ plates (continued)	M-1	Stainless Steel	Treated Water (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.D1-5 (SP-17)	3.4.1-14	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
	M-3	Stainless Steel	Treated Water (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.D1-5 (SP-17)	3.4.1-14	A

TABLE 3.4.2-8 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Main Feedwater Pump Turbine Lube Oil Pumps	M-1	Carbon or Low Alloy Steel	Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VIII.D1-6 (SP-25)	3.4.1-07	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
Main Feedwater Pump Turbines	M-1	Carbon or Low Alloy Steel	Steam (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.B1-10 (S-08)	3.4.1-01	C
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.A-16 (S-06)	3.4.1-02	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A

TABLE 3.4.2-8 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Main Feedwater Pumps	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-8 (S-10)	3.4.1-04	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.D1-7 (S-11)	3.4.1-01	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
Piping Insulation	M-6	Insulation	Air - Indoor Uncontrolled (Outside)	None	None			J
Piping, piping components, piping elements, and tanks	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-2 (EP-3)	3.2.1-50	C

TABLE 3.4.2-8 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Carbon or Low Alloy Steel	Dried Air (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	C
			Dry Gas (Inside)	None	None	VIII.I-15 (SP-4)	3.4.1-44	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-8 (S-10)	3.4.1-04	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.D1-7 (S-11)	3.4.1-01	A
				Loss of Material due to FAC	Flow-Accelerated Corrosion	VIII.D1-9 (S-16)	3.4.1-29	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A
		Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	C
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	A

TABLE 3.4.2-8 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Glass	Air - Indoor Uncontrolled (Inside)	None	None	VIII.I-4 (SP-33)	3.4.1-40	A
			Treated Water (Inside)	None	None	VIII.I-8 (SP-35)	3.4.1-40	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-4 (SP-33)	3.4.1-40	A
		Stainless Steel	Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	C
			Dry Gas (Inside)	None	None	VIII.I-12 (SP-15)	3.4.1-44	A
			Treated Water (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.D1-5 (SP-17)	3.4.1-14	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A

TABLE 3.4.2-8 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
System Separator Filter/Housing	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.D1-5 (SP-17)	3.4.1-14	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
	M-2	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.D1-5 (SP-17)	3.4.1-14	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A

TABLE 3.4.2-8 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN FEEDWATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
System strainer screens/elements	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-8 (S-10)	3.4.1-04	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.D1-7 (S-11)	3.4.1-01	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
	M-2	Stainless Steel	Treated Water (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.D1-5 (SP-17)	3.4.1-14	A

TABLE 3.4.2-9 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – GLAND STEAM SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VIII.H-5 (S-33)	3.4.1-22	A
				Loss of Material due to General Corrosion	Bolting Integrity	VIII.H-4 (S-34)	3.4.1-22	A
Flow restricting orifice housing/plates	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.B1-10 (S-08)	3.4.1-01	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.B1-11 (S-10)	3.4.1-04	A
				Loss of Material due to FAC	Flow-Accelerated Corrosion	VIII.F-26 (S-16)	3.4.1-29	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A

TABLE 3.4.2-9 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – GLAND STEAM SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting orifice housing/plates (continued)	M-1	Stainless Steel	Treated Water (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.B1-4 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.B1-5 (SP-17)	3.4.1-14	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
	M-3	Stainless Steel	Treated Water (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.B1-4 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.B1-5 (SP-17)	3.4.1-14	A

TABLE 3.4.2-9 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – GLAND STEAM SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Gland Steam Condenser Components	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VIII.B1-7 (SP-60)	3.4.1-30	C
			Steam (Inside)	Loss of Material due to General Corrosion	Water Chemistry			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VIII.B1-8 (S-07)	3.4.1-37	C
				Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.B1-10 (S-08)	3.4.1-01	C
			Treated Water (Inside)	Loss of Material due to Galvanic Corrosion	Water Chemistry and One-Time Inspection			J, 403
				Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.B1-10 (S-08)	3.4.1-01	C
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.B1-11 (S-10)	3.4.1-04	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A

TABLE 3.4.2-9 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – GLAND STEAM SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Gland Steam Condenser Components (continued)	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.B1-4 (SP-16)	3.4.1-16	C
			Steam (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VIII.B1-3 (SP-43)	3.4.1-37	C
				Cracking due to SCC	Water Chemistry	VIII.B1-2 (SP-44)	3.4.1-39	C
Gland Steam Condenser Tubes	M-5	Stainless Steel	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Water Chemistry and One-Time Inspection	VIII.F-10 (SP-40)	3.4.1-09	C
			Steam (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Water Chemistry and One-Time Inspection			J
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-2 (EP-3)	3.2.1-50	C

TABLE 3.4.2-9 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – GLAND STEAM SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VIII.B1-7 (SP-60)	3.4.1-30	A
			Steam (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VIII.B1-8 (S-07)	3.4.1-37	A
				Loss of Material due to General Corrosion	Water Chemistry	VIII.B1-8 (S-07)		H
				Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.B1-10 (S-08)	3.4.1-01	A
			Treated Water (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.B1-10 (S-08)	3.4.1-01	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.B1-11 (S-10)	3.4.1-04	A
				Loss of Material due to FAC	Flow-Accelerated Corrosion	VIII.F-26 (S-16)	3.4.1-29	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A

TABLE 3.4.2-9 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – GLAND STEAM SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	C
			Steam (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection			J
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	A
System strainer screens/elements	M-1	Carbon or Low Alloy Steel	Steam (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VIII.B1-8 (S-07)	3.4.1-37	A
				Loss of Material due to General Corrosion	Water Chemistry	VIII.B1-8 (S-07)		H
				Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.B1-10 (S-08)	3.4.1-01	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A

TABLE 3.4.2-9 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – GLAND STEAM SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
System strainer screens/elements (continued)	M-2	Stainless Steel	Steam (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VIII.B1-3 (SP-43)	3.4.1-37	A
				Cracking due to SCC	Water Chemistry	VIII.B1-2 (SP-44)	3.4.1-39	A

TABLE 3.4.2-10 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – GLAND SEAL WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VIII.H-5 (S-33)	3.4.1-22	A
				Loss of Material due to General Corrosion	Bolting Integrity	VIII.H-4 (S-34)	3.4.1-22	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-2 (S-40)	3.4.1-38	A
Condensate Injection Pumps	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-34 (S-10)	3.4.1-04	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
Flow restricting orifice housing/plates	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-34 (S-10)	3.4.1-04	C
				Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.G-37 (S-11)	3.4.1-01	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A

TABLE 3.4.2-10 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – GLAND SEAL WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting orifice housing/plates (continued)	M-1	Stainless Steel	Treated Water (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-29 (SP-16)	3.4.1-16	C
				Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.E-30 (SP-17)	3.4.1-14	C
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
	M-3	Stainless Steel	Treated Water (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-29 (SP-16)	3.4.1-16	C
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.E-30 (SP-17)	3.4.1-14	C
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-2 (EP-3)	3.2.1-50	C

TABLE 3.4.2-10 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – GLAND SEAL WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-34 (S-10)	3.4.1-04	C
				Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.G-37 (S-11)	3.4.1-01	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A
		Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	C
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	A
		Glass	Treated Water (Inside)	None	None	VIII.I-8 (SP-35)	3.4.1-40	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-5 (SP-9)	3.4.1-40	A

TABLE 3.4.2-10 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – GLAND SEAL WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Treated Water (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-29 (SP-16)	3.4.1-16	C
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.E-30 (SP-17)	3.4.1-14	C
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Seal Water Return Pumps	M-1	Copper and Copper Alloys	Treated Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VIII.E-21 (SP-55)	3.4.1-35	D
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.F-15 (SP-61)	3.4.1-15	C
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	A

TABLE 3.4.2-10 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – GLAND SEAL WATER SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Seal Water Return Unit	M-1	Gray Cast Iron	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-34 (S-10)	3.4.1-04	C
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VIII.E-23 (SP-27)	3.4.1-36	D
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
System strainer screens/elements	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-34 (S-10)	3.4.1-04	C
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
	M-2	Stainless Steel	Treated Water (Outside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-29 (SP-16)	3.4.1-16	C
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.E-30 (SP-17)	3.4.1-14	C

TABLE 3.4.2-11 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN FEEDWATER TURBINE LUBE OIL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VIII.H-5 (S-33)	3.4.1-22	A
				Loss of Material due to General Corrosion	Bolting Integrity	VIII.H-4 (S-34)	3.4.1-22	A
Feedwater Pump Turbine Oil Reserviors	M-1	Carbon or Low Alloy Steel	Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VIII.D1-6 (SP-25)	3.4.1-07	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
		Glass	Lubricating Oil (Inside)	None	None	VIII.I-6 (SP-10)	3.4.1-40	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-5 (SP-9)	3.4.1-40	A

TABLE 3.4.2-11 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN FEEDWATER TURBINE LUBE OIL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Main Feedwater Pump Turbine and Booster Pump Lube Oil Cooler Components	M-1	Carbon or Low Alloy Steel	Closed Cycle Cooling Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	B
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
		Copper and Copper Alloys	Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VIII.D1-2 (SP-32)	3.4.1-18	C
			Closed Cycle Cooling Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	D
Main Feedwater Pump Turbine and Booster Pump Lube Oil Cooler Tubes	M-5	Copper and Copper Alloys	Lubricating Oil (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Lubricating Oil Analysis and One-Time Inspection	VIII.G-8 (SP-53)	3.4.1-10	C
			Closed Cycle Cooling Water (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	B

TABLE 3.4.2-11 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN FEEDWATER TURBINE LUBE OIL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to General Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-23 (A-23)	3.3.1-71	C
			Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VIII.D1-6 (SP-25)	3.4.1-07	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
			Lubricating Oil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VIII.D1-6 (SP-25)	3.4.1-07	A
		Copper and Copper Alloys	Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VIII.D1-2 (SP-32)	3.4.1-18	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	A

TABLE 3.4.2-11 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN FEEDWATER TURBINE LUBE OIL SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Lubricating Oil (Inside)	Cracking due to SCC	Lubricating Oil Analysis and One-Time Inspection			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VIII.D1-3 (SP-38)	3.4.1-19	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
System strainers	M-1	Carbon or Low Alloy Steel	Lubricating Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VIII.D1-6 (SP-25)	3.4.1-07	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
	M-2	Stainless Steel	Lubricating Oil (Outside)	Flow Blockage due to Fouling	Lubricating Oil Analysis and One-Time Inspection			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VIII.D1-3 (SP-38)	3.4.1-19	A

TABLE 3.4.2-12 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN STEAM SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VIII.H-5 (S-33)	3.4.1-22	A
				Loss of Material due to General Corrosion	Bolting Integrity	VIII.H-4 (S-34)	3.4.1-22	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-2 (S-40)	3.4.1-38	A
Containment Isolation Piping and Components	M-1	Carbon or Low Alloy Steel	Steam (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VIII.B1-8 (S-07)	3.4.1-37	A
				Loss of Material due to General Corrosion	Water Chemistry	VIII.B1-8 (S-07)		H
				Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.B1-10 (S-08)	3.4.1-01	A
			Treated Water (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.B1-10 (S-08)	3.4.1-01	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.B1-11 (S-10)	3.4.1-04	A
				Loss of Material due to FAC	Flow-Accelerated Corrosion	VIII.F-26 (S-16)	3.4.1-29	A

TABLE 3.4.2-12 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN STEAM SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment Isolation Piping and Components (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A
		Stainless Steel	Steam (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VIII.B1-3 (SP-43)	3.4.1-37	A
				Cracking due to SCC	Water Chemistry	VIII.B1-2 (SP-44)	3.4.1-39	A
			Treated Water (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.B1-4 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.B1-5 (SP-17)	3.4.1-14	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A

TABLE 3.4.2-12 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN STEAM SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Expansion Joints	M-1	Carbon or Low Alloy Steel	Steam (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VIII.B1-8 (S-07)	3.4.1-37	A
				Loss of Material due to General Corrosion	Water Chemistry	VIII.B1-8 (S-07)		H
				Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.B1-10 (S-08)	3.4.1-01	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
		Stainless Steel	Steam (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VIII.B1-3 (SP-43)	3.4.1-37	A
				Cracking due to SCC	Water Chemistry	VIII.B1-2 (SP-44)	3.4.1-39	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Piping Insulation	M-6	Insulation	Air - Indoor Uncontrolled (Outside)	None	None			J

TABLE 3.4.2-12 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN STEAM SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks	M-1	Aluminum or Aluminum Alloys	Dried Air (Inside)	None	None			J
			Air - Indoor Uncontrolled (Outside)	None	None	V.F-2 (EP-3)	3.2.1-50	C
		Carbon or Low Alloy Steel	Dried Air (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	C
			Dry Gas (Inside)	None	None	VIII.I-15 (SP-4)	3.4.1-44	A
			Steam (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VIII.B1-8 (S-07)	3.4.1-37	A
				Loss of Material due to General Corrosion	Water Chemistry	VIII.B1-8 (S-07)		H
				Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.B1-10 (S-08)	3.4.1-01	A
			Treated Water (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.B1-10 (S-08)	3.4.1-01	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.B1-11 (S-10)	3.4.1-04	A
				Loss of Material due to FAC	Flow-Accelerated Corrosion	VIII.F-26 (S-16)	3.4.1-29	A

TABLE 3.4.2-12 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN STEAM SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A
		Copper and Copper Alloys	Dried Air (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	C
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	A
		Stainless Steel	Dried Air (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	C
			Steam (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VIII.B1-3 (SP-43)	3.4.1-37	A
				Cracking due to SCC	Water Chemistry	VIII.B1-2 (SP-44)	3.4.1-39	A

TABLE 3.4.2-12 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN STEAM SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Stainless Steel	Treated Water (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.B1-4 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.B1-5 (SP-17)	3.4.1-14	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A

TABLE 3.4.2-13 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – RELIEF VALVE VENT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VIII.H-5 (S-33)	3.4.1-22	A
				Loss of Material due to General Corrosion	Bolting Integrity	VIII.H-4 (S-34)	3.4.1-22	A
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air - Indoor Uncontrolled (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VIII.B1-7 (SP-60)	3.4.1-30	A
			Air - Outdoor (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VIII.B1-6 (SP-59)	3.4.1-30	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A
			Air - Outdoor (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-8 (S-41)	3.4.1-28	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VIII.H-8 (S-41)		H

TABLE 3.4.2-14 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECONDARY PLANT SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting elements	M-1	Stainless Steel	Treated Water (Inside)	Cumulative Fatigue Damage due to Fatigue	TLAA			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.D1-5 (SP-17)	3.4.1-14	A
			Air - Indoor Uncontrolled (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A

TABLE 3.4.2-15 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CYCLE STARTUP SYSTEM

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Bolting (Carbon or Low Alloy Steel / Stainless Steel)	Air - Indoor Uncontrolled (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VIII.H-5 (S-33)	3.4.1-22	A
				Loss of Material due to General Corrosion	Bolting Integrity	VIII.H-4 (S-34)	3.4.1-22	A
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-8 (S-10)	3.4.1-04	A
				Cumulative Fatigue Damage due to Fatigue	TLAA	VIII.D1-7 (S-11)	3.4.1-01	A
			Air - Indoor Uncontrolled (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A

Notes for Tables 3.4.2-1 through 3.4.2-15:

Generic Notes:

A. Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B. Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C. Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

D. Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

E. Consistent with NUREG-1801 item for material, environment, and aging effect, but a different AMP is credited or NUREG-1801 identifies a plant-specific AMP.

F. Material not in NUREG-1801 for this component.

G. Environment not in NUREG-1801 for this component and material.

H. Aging effect not in NUREG-1801 for this component, material and environment combination.

I. Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

J. Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant-specific Notes:

401. Portions of the Auxiliary Steam System are abandoned in place with an internal environment of indoor air.
402. The component is a plate frame heat exchanger with no tubes or shell.
403. The Water Chemistry Program will minimize contaminant concentration and mitigate loss of material due to galvanic corrosion.

3.5 AGING MANAGEMENT OF CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

3.5.1 INTRODUCTION

Section 3.5 provides the results of the aging management reviews (AMRs) for those components identified in Subsection 2.4, Scoping and Screening Results - Structures, subject to aging management review. The systems or portions of systems are described in the indicated subsections.

1. Reactor Building (Subsection 2.4.1)
2. Other Class I and In-Scope Structures:
    a. Auxiliary Building (Subsection 2.4.2.1)
    b. Wave Embankment Protection Structure (Subsection 2.4.2.2)
    c. Borated Water Storage Tank Foundation and Shield Wall (Subsection 2.4.2.3)
    d. Cable Bridge (Subsection 2.4.2.4)
    e. Control Complex (Subsection 2.4.2.5)
    f. Intake and Discharge Canals (Subsection 2.4.2.6)
    g. Circulating Water Discharge Structure (Subsection 2.4.2.7)
    h. Circulating Water Intake Structure (Subsection 2.4.2.8)
    i. Diesel Generator Building (Subsection 2.4.2.9)
    j. EFW Pump Building (Subsection 2.4.2.10)
    k. Dedicated EFW Tank Enclosure Building (Subsection 2.4.2.11)
    l. Fire Service Pumphouse (Subsection 2.4.2.12)
    m. Intermediate Building (Subsection 2.4.2.13)
    n. Machine Shop (Subsection 2.4.2.14)
    o. Miscellaneous Structures (Subsection 2.4.2.15)

p. Switchyard for Crystal River Site (Subsection 2.4.2.16)

q. Switchyard Relay Building (Subsection 2.4.2.17)

r. Turbine Building (Subsection 2.4.2.18)

Table 3.5.1, Summary of Aging Management Evaluations in Chapter II and III of NUREG-1801 for Containments, Structures, and Component Supports, provides the summary of the programs evaluated in NUREG-1801 that are applicable to component/ commodity groups in this Section. Table 3.5.1 uses the format of Table 1 described in Section 3.0 above.

3.5.1.1 Operating Experience

The AMR methodology applied at CR-3 included use of operating experience (OE) to confirm the set of aging effects that had been identified through material/environment evaluations. Plant-specific and industry OE was identified and reviewed in conjunction with the aging management review. The OE review consisted of the following:

Site: CR-3 site-specific OE has been captured by a review of the Action Tracking, Maintenance Rule, and OE databases and the results of inspections and assessments applicable to CR-3 structures. Relevant information provided by the Structural Systems Engineer was considered. The site-specific OE review identified stress corrosion cracking (SCC) of the Fuel Pool liner. The metallurgical investigation determined that the liner defects were due to SCC in the heat affected zone of the liner seam welds.

Industry: Industry OE has been captured in NUREG-1801, "Generic Aging Lessons Learned (GALL)," and is the primary method for verifying that a complete set of potential aging effects is identified. An evaluation of industry OE published since the effective date of NUREG-1801, Revision 1, was performed to identify any additional aging effects requiring management. This was performed using the Progress Energy internal OE review process which directs the review of OE and requires that it be screened and evaluated for site applicability. OE sources subject to review include INPO and WANO items, NRC documents (Information Notices, Generic Letters, Notices of Violation, and staff reports), 10 CFR 21 reports, and vendor bulletins, as well as corporate internal OE information from Progress Energy nuclear sites. The industry OE review identified no additional unpredicted or unique aging effects requiring management.

On-Going On-going review of plant-specific and industry operating experience is continuing to be performed in accordance with the Corrective Action Program and the Progress Energy OE review program.

3.5.2 RESULTS

The following tables summarize the results of the aging management review for Containments, Structures and Component Supports.

Table 3.5.2-14 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Intermediate Building

Table 3.5.2-15 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Machine Shop

Table 3.5.2-16 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Miscellaneous Structures

Table 3.5.2-17 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Switchyard for Crystal River Site

Table 3.5.2-18 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Switchyard Relay Building

Table 3.5.2-19 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Turbine Building

These tables use the format of Table 2 described in Section 3.0 above.

3.5.2.1 Materials, Environment, Aging Effects Requiring Management and Aging Management Programs

The materials from which specific components/commodities are fabricated, the environments to which they are exposed, the aging effects requiring management, and the aging management programs used to manage these aging effects are provided for each of the above structures in the following subsections.

3.5.2.1.1 Reactor Building

Materials

The materials of construction for the Reactor Building components are:

- Aluminum
- Carbon Steel
- Elastomers
- Fire Proofing Materials
- Fluorogold
- Galvanized Carbon Steel
- Insulation
- Reinforced Concrete
- Stainless Steel

Environment

The Reactor Building components are exposed to the following:

- Air-Indoor
- Air-Outdoor
- Borated Water Leakage
- Reinforced Concrete
- Soil
- Treated Water

Aging Effects Requiring Management

The following Reactor Building aging effects require management:

- Change in Material Properties
- Cracking
- Delamination
- Lock-Up
- Loss of Leak Tightness in Closed Condition
- Loss of Mechanical Function
- Loss of Material
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation
- Separation

Aging Management Programs

The following AMPs manage the aging effects for the Reactor Building components:

- 10 CFR Part 50, Appendix J Program
- ASME Section XI, Subsection IWE Program
- ASME Section XI, Subsection IWL Program
- ASME Section XI, Subsection IWF Program
- Bolting Integrity Program
- Boric Acid Corrosion Program
- Fire Protection Program
- Inspection of Overhead Heavy Load and Light Load Handling Systems Program
- Structures Monitoring Program
- Water Chemistry Program

3.5.2.1.2 Auxiliary Building

Materials

The materials of construction for the Auxiliary Building components are:

- Aluminum
- Boral
- Carbon Steel
- Carborundum (B_4C)
- Concrete Block
- Copper
- Elastomers
- Fire Proofing Materials
- Fluorogold
- Galvanized Carbon Steel
- Reinforced Concrete
- Stainless Steel

Environment

The Auxiliary Building components are exposed to the following:

- Air-Indoor
- Air-Outdoor
- Borated Water Leakage
- Raw Water - Seawater
- Reinforced Concrete
- Soil
- Treated Water

Aging Effects Requiring Management

The following Auxiliary Building aging effects require management:

- Change in Material Properties
- Cracking
- Delamination
- Loss of Material
- Loss of Mechanical Function
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation
- Separation

Aging Management Programs

The following AMPs manage the aging effects for the Auxiliary Building components:

- ASME Section XI, Subsection IWF Program
- Boric Acid Corrosion Program
- Carborundum (B_4C) Program
- Fire Protection Program
- Inspection of Overhead Heavy Load and Light Load Handling Systems Program
- Masonry Wall Program
- Structures Monitoring Program
- Water Chemistry Program

3.5.2.1.3 Wave Embankment Protection Structure

Materials

The materials of construction for the Wave Embankment Protection Structure components are:

- Earth
- Reinforced Concrete (includes Unreinforced Concrete and Fabriform)

Environment

The Wave Embankment Protection Structure components are exposed to the following:

- Air-Outdoor
- Soil

Aging Effects Requiring Management

The following Wave Embankment Protection Structure aging effects require management:

- Change in Material Properties
- Cracking
- Loss of Form
- Loss of Material

Aging Management Programs

The following AMP manages the aging effects for the Wave Embankment Protection Structure components:

- Structures Monitoring Program

3.5.2.1.4 Borated Water Storage Tank Foundation and Shield Wall

Materials

The materials of construction for the Borated Water Storage Tank Foundation and Shield Wall components are:

- Aluminum
- Carbon Steel
- Elastomers
- Galvanized Carbon Steel
- Reinforced Concrete

Environment

The Borated Water Storage Tank Foundation and Shield Wall components are exposed to the following:

- Air-Indoor
- Air-Outdoor
- Borated Water Leakage
- Reinforced Concrete

Aging Effects Requiring Management

The following Borated Water Storage Tank Foundation and Shield Wall aging effects require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Mechanical Function
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation

Aging Management Programs

The following AMPs manage the aging effects for the Borated Water Storage Tank Foundation and Shield Wall components:

- Boric Acid Corrosion Program
- Structures Monitoring Program

3.5.2.1.5 Cable Bridge

Materials

The materials of construction for the Cable Bridge components are:
- Aluminum
- Carbon Steel
- Fluorogold
- Galvanized Carbon Steel
- Reinforced Concrete
- Stainless Steel

Environment

The Cable Bridge components are exposed to the following:
- Air-Indoor
- Air-Outdoor
- Raw Water - Seawater
- Reinforced Concrete
- Soil

Aging Effects Requiring Management

The following Cable Bridge aging effects require management:
- Change in Material Properties
- Cracking
- Lock-up
- Loss of Material
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation

Aging Management Programs

The following AMP manages the aging effects for the Cable Bridge components:
- Structures Monitoring Program

3.5.2.1.6 Control Complex

Materials

The materials of construction for the Control Complex components are:

- Aluminum
- Carbon Steel
- Concrete Block
- Copper
- Elastomers
- Fire Proofing Materials
- Galvanized Carbon Steel
- Reinforced Concrete
- Stainless Steel
- Willtec Foam (Control Room Ceiling Panels)

Environment

The Control Complex components are exposed to the following:

- Air-Indoor
- Air-Outdoor
- Reinforced Concrete
- Soil

Aging Effects Requiring Management

The following Control Complex aging effects require management:

- Change in Material Properties
- Cracking
- Delamination
- Loss of Material
- Loss of Mechanical Function
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation
- Reduction or Loss of Isolation Function
- Separation

Aging Management Programs

The following AMPs manage the aging effects for the Control Complex components:

- ASME Section XI, Subsection IWF Program
- Fire Protection Program
- Masonry Wall Program
- Structures Monitoring Program

3.5.2.1.7 Intake and Discharge Canals

Materials

The material of construction for the Intake and Discharge Canals components is:
- o Earth

Environment

The Intake and Discharge Canals components are exposed to the following:
- Air-Outdoor
- Raw Water - Seawater

Aging Effects Requiring Management

The following Intake and Discharge Canals aging effects require management:
- Loss of Form
- Loss of Material

Aging Management Programs

The following AMP manages the aging effects for the Intake and Discharge Canals components:
- Structures Monitoring Program

3.5.2.1.8 Circulating Water Discharge Structure

Materials

The material of construction for the Circulating Water Discharge Structure components is:
- Reinforced Concrete

Environment

The Circulating Water Discharge Structure components are exposed to the following:
- Air-Outdoor
- Raw Water - Seawater
- Soil

Aging Effects Requiring Management

The following Circulating Water Discharge Structure aging effects require management:

- Change in Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following AMP manages the aging effects for the Circulating Water Discharge Structure components:

- Structures Monitoring Program

3.5.2.1.9 Circulating Water Intake Structure

Materials

The materials of construction for the Circulating Water Intake Structure components are:

- Carbon Steel
- Galvanized Carbon Steel
- Reinforced Concrete
- Stainless Steel

Environment

The Circulating Water Intake Structure components are exposed to the following:

- Air-Outdoor
- Raw Water - Seawater
- Reinforced Concrete
- Soil

Aging Effects Requiring Management

The following Circulating Water Intake Structure aging effects require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation

Aging Management Programs

The following AMPs manage the aging effects for the Circulating Water Intake Structure components:

- Inspection of Overhead Heavy Load and Light Load Handling Systems Program
- Structures Monitoring Program

3.5.2.1.10 Diesel Generator Building

Materials

The materials of construction for the Diesel Generator Building components are:

- Aluminum
- Carbon Steel
- Elastomers
- Fire Proofing Materials
- Galvanized Carbon Steel
- Reinforced Concrete
- Stainless Steel

Environment

The Diesel Generator Building components are exposed to the following:

- Air-Indoor
- Air-Outdoor
- Reinforced Concrete
- Soil

Aging Effects Requiring Management

The following Diesel Generator Building aging effects require management:

- Change in Material Properties
- Cracking
- Delamination
- Loss of Material
- Loss of Mechanical Function
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation
- Separation

Aging Management Programs

The following AMPs manage the aging effects for the Diesel Generator Building components:

- ASME Section XI, Subsection IWF Program
- Fire Protection Program
- Structures Monitoring Program

3.5.2.1.11 EFW Pump Building

Materials

The materials of construction for the EFW Pump Building components are:

- Aluminum
- Carbon Steel
- Elastomers
- Galvanized Carbon Steel
- Reinforced Concrete
- Stainless Steel

Environment

The EFW Pump Building components are exposed to the following:

- Air-Indoor
- Air-Outdoor
- Reinforced Concrete
- Soil

Aging Effects Requiring Management

The following EFW Pump Building aging effects require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Mechanical Function
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation

Aging Management Programs

The following AMPs manage the aging effects for the EFW Pump Building components:

- ASME Section XI, Subsection IWF Program
- Fire Protection Program
- Inspection of Overhead Heavy Load and Light Load Handling Systems Program
- Structures Monitoring Program

3.5.2.1.12 Dedicated EFW Tank Enclosure Building

Materials

The materials of construction for the Dedicated EFW Tank Enclosure Building components are:

- Aluminum
- Carbon Steel
- Elastomers
- Galvanized Carbon Steel
- Reinforced Concrete
- Stainless Steel

Environment

The Dedicated EFW Tank Enclosure Building components are exposed to the following:

- Air-Indoor
- Air-Outdoor
- Reinforced Concrete
- Soil
- Treated Water

Aging Effects Requiring Management

The following Dedicated EFW Tank Enclosure Building aging effects require management:

- Change in Material Properties
- Cracking
- Loss of Mechanical Function
- Loss of Material
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation

Aging Management Programs

The following AMPs manage the aging effects for the Dedicated EFW Tank Enclosure Building components:

- ASME Section XI, Subsection IWF Program
- Structures Monitoring Program

3.5.2.1.13 Fire Service Pumphouse

Materials

The materials of construction for the Fire Service Pumphouse components are:

- Aluminum
- Carbon Steel
- Concrete Block
- Elastomers
- Galvanized Carbon Steel
- Reinforced Concrete
- Stainless Steel

Environment

The Fire Service Pumphouse components are exposed to the following:

- Air-Indoor
- Air-Outdoor
- Reinforced Concrete
- Soil

Aging Effects Requiring Management

The following Fire Service Pumphouse aging effects require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation

Aging Management Programs

The following AMPs manage the aging effects for the Fire Service Pumphouse components:

- Masonry Wall Program
- Structures Monitoring Program

3.5.2.1.14 Intermediate Building

Materials

The materials of construction for the Intermediate Building components are:

- Aluminum
- Carbon Steel
- Elastomers
- Fire Proofing Materials
- Fluorogold
- Galvanized Carbon Steel
- Reinforced Concrete
- Stainless Steel

Environment

The Intermediate Building components are exposed to the following:

- Air-Indoor
- Air-Outdoor
- Borated Water Leakage
- Reinforced Concrete
- Soil

Aging Effects Requiring Management

The following Intermediate Building aging effects require management:

- Change in Material Properties
- Cracking
- Delamination
- Loss of Material
- Loss of Mechanical Function
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation
- Reduction or Loss of Isolation Function
- Separation

Aging Management Programs

The following AMPs manage the aging effects for the Intermediate Building components:

- ASME Section XI, Subsection IWF Program
- Boric Acid Corrosion Program
- Fire Protection Program
- Structures Monitoring Program

3.5.2.1.15 Machine Shop

Materials

The materials of construction for the Machine Shop components are:

- Aluminum
- Carbon Steel
- Elastomers

Environment

The Machine Shop components are exposed to the following:

- Air-Indoor
- Air-Outdoor

Aging Effects Requiring Management

The following Machine Shop aging effects require management:

- Loss of Material
- Reduction or Loss of Isolation Function

Aging Management Programs

The following AMP manages the aging effects for the Machine Shop components:

- Structures Monitoring Program

3.5.2.1.16 Miscellaneous Structures

Materials

The materials of construction for the Miscellaneous Structures components are:

- Aluminum
- Carbon Steel
- Elastomers
- Galvanized Carbon Steel
- Reinforced Concrete
- Stainless Steel

Environment

The Miscellaneous Structures components are exposed to the following:

- Air-Indoor

- Air-Outdoor
- Reinforced Concrete
- Soil

Aging Effects Requiring Management

The following Miscellaneous Structures aging effects require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation

Aging Management Programs

The following AMPs manage the aging effects for the Miscellaneous Structures components:

- Fire Protection Program
- Structures Monitoring Program
- One-Time Inspection Program

3.5.2.1.17 Switchyard for Crystal River Site

Materials

The materials of construction for the Switchyard for Crystal River Site components are:

- Aluminum
- Carbon Steel
- Galvanized Carbon Steel
- Reinforced Concrete

Environment

The Switchyard for Crystal River Site components are exposed to the following:

- Air-Indoor
- Air-Outdoor
- Reinforced Concrete
- Soil

Aging Effects Requiring Management

The following Switchyard for Crystal River Site aging effects require management:

- Change in Material Properties
- Cracking

- Loss of Material
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation

Aging Management Programs

The following AMP manages the aging effects for the Switchyard for Crystal River Site components:

- Structures Monitoring Program

3.5.2.1.18 Switchyard Relay Building

Materials

The materials of construction for the Switchyard Relay Building components are:

- Aluminum
- Carbon Steel
- Concrete Block
- Elastomers
- Galvanized Carbon Steel
- Reinforced Concrete

Environment

The Switchyard Relay Building components are exposed to the following:

- Air-Indoor
- Air-Outdoor
- Reinforced Concrete
- Soil

Aging Effects Requiring Management

The following Switchyard Relay Building aging effects require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation

Aging Management Programs

The following AMPs manage the aging effects for the Switchyard Relay Building components:

- Masonry Wall Program
- Structures Monitoring Program

3.5.2.1.19 Turbine Building

Materials

The materials of construction for the Turbine Building components are:

- Aluminum
- Carbon Steel
- Concrete Block
- Elastomers
- Fire Proofing Materials
- Galvanized Carbon Steel
- Reinforced Concrete
- Stainless Steel

Environment

The Turbine Building components are exposed to the following:

- Air-Indoor
- Air-Outdoor
- Reinforced Concrete
- Soil

Aging Effects Requiring Management

The following Turbine Building aging effects require management:

- Change in Material Properties
- Cracking
- Delamination
- Loss of Material
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation
- Reduction or Loss of Isolation Function
- Separation

Aging Management Programs

The following AMPs manage the aging effects for the Turbine Building components:

- Fire Protection Program
- Masonry Wall Program
- Structures Monitoring Program

3.5.2.2 Further Evaluation of Aging Management as Recommended by NUREG-1801

NUREG-1801 identifies those aging management activities that warrant further evaluation. For the Containments, Structures, and Component Supports, these activities are addressed in the following subsections.

3.5.2.2.1 PWR and BWR Containments

3.5.2.2.1.1 Aging of Inaccessible Concrete Areas

For the Reactor Building (RB) structure, the ASME Section XI, Subsection IWL Program is used to manage aging of accessible concrete areas due to aggressive chemical attack, and corrosion of embedded steel.

The CR-3 site groundwater is non-aggressive based on samples taken in February 2007 from two wells:

- Well CR3-1S - pH 7.19, chlorides 450 ppm, sulfates 140 ppm, phosphates < 0.5 ppm; and
- Well CR3-2 - pH 7.64, chlorides 37 ppm, sulfates 11 ppm, phosphates < 0.5 ppm.

For inaccessible areas of plants with non-aggressive groundwater/soil, the following is required: (1) Examination of the exposed portions of the below grade concrete, when excavated for any reason, and (2) Periodic monitoring of below-grade water chemistry, including consideration of potential seasonal variations.

With respect to monitoring inaccessible areas, the below grade portions of RB concrete are surrounded by other concrete structures. Below-grade RB concrete cannot be examined unless the concrete of surrounding structures is removed. However, examination of exposed representative portions of below grade concrete in the same groundwater environment for the surrounding structures is performed when uncovered during removal of backfill. This is considered equivalent to examining the RB concrete.

In addition, the Structures Monitoring Program is used to ensure that groundwater is monitored on a periodic basis including consideration of potential seasonal variations.

3.5.2.2.1.2 Cracks and Distortion Due to Increased Stress Levels from Settlement; Reduction of Foundation Strength, Cracking and Differential Settlement Due to Erosion of Porous Concrete Subfoundations, if Not Covered by Structures Monitoring Program

Aging effects caused by settlement are managed by the Structures Monitoring Program. A de-watering system is not relied upon for control of settlement.

The structures were founded on 1,500 psi fill concrete placed over competent existing limerock. For the RB, a settlement analysis determined the upper limit of total settlement to be on the order of 0.875 in., and that all but a very small fraction of settlement would occur during construction (Refer to FSAR Section 2.5.7.2.). No cracking due to settlement is expected or has been observed; however, the Structures Monitoring Program examines concrete for cracking and is credited for managing the aging effect of cracking.

The NUREG-1801 item regarding erosion of porous concrete subfoundations is not applicable. CR-3 does not have a porous concrete subfoundation.

3.5.2.2.1.3 Reduction of Strength and Modulus of Concrete Structures Due to Elevated Temperature

The NUREG-1801 item regarding concrete degradation from elevated temperatures is not applicable, because no RB pressure boundary concrete structural components exceed the specified temperature limits.

The RB Cooling System maintains the RB general area below an average temperature of 130°F. The local area concrete in the cylinder wall where hot pipes pass through is maintained at below 200°F either by insulation on the pipe or a combination of insulation and a Penetration Cooling System on several penetrations.

RB non-pressure boundary concrete is discussed in Subsection 3.5.2.2.2.3.

3.5.2.2.1.4 Loss of Material Due to General, Pitting, and Crevice Corrosion

The aging effect for the RB liner, liner anchors, and integral attachments is managed by the ASME Section XI, Subsection IWE and 10 CFR Part 50, Appendix J Programs.

Loss of material due to corrosion is not significant for inaccessible areas, i.e., embedded containment steel liner, based on meeting the conditions specified as follows:

1. Concrete meeting ACI 318 was used in contact with the embedded steel liner. ACI 201.2R was not used as guidance for concrete mix proportions, but ACI 301-66 was used, and it provides similar guidance to produce a low permeability, dense, air entrained, low water-cement ratio concrete, properly placed and cured.

2. The RB Liner is monitored for corrosion or degraded protective coatings by the ASME Section XI, Subsection IWE Program.

3. The moisture barrier is monitored for aging effects by the ASME Section XI, Subsection IWE Program.

4. Borated water spills and water ponding on the RB floor are not common, and are cleaned up promptly when identified. The design of the RB floor provides for collection of water in a sump area that is maintained pumped-down.

3.5.2.2.1.5 Loss of Prestress Due to Relaxation, Shrinkage, Creep, and Elevated Temperature

The RB is a prestressed concrete containment. Loss of prestress forces due to relaxation, shrinkage, creep, and elevated temperature for the CR-3 RB is a TLAA as defined in 10 CFR 54.3. The evaluation of this TLAA is addressed separately in Section 4.5 of the LRA.

3.5.2.2.1.6 Cumulative Fatigue Damage

Fatigue is a TLAA for the expansion bellows associated with the Fuel Transfer Tube inside the RB and inside the Auxiliary Building (AB). The evaluation of this TLAA is provided in Section 4.6 of the LRA. A fatigue analysis does not exist in the current licensing basis (CLB) for the liner plate, penetration sleeves, and dissimilar metal welds between the fuel transfer tubes and the penetration sleeves.

Penetration bellows are installed outside the RB and are not part of the Containment pressure boundary; therefore, they are not in the scope of License Renewal.

Also, the NUREG-1801 BWR components, i.e. suppression pool shell and unbraced downcomers are not applicable to the CR-3 PWR containment.

3.5.2.2.1.7 Cracking Due to Stress Corrosion Cracking (SCC)

Cracking due to SCC is not an applicable effect for penetration sleeves and dissimilar metal welds; because, to be susceptible to SCC, stainless steel must be subjected to both high temperature (>140°F) and an aggressive chemical environment, unless there is plant specific operating experience showing SCC. The penetration sleeves and the dissimilar metal weld components are in the Air-Indoor environment and not subject to an aggressive chemical environment.

The exterior surface of the stainless steel fuel transfer tubes and associated components located in the RB Refuel Canal are included in this commodity group because the fuel transfer tubes are examined by the ASME Section XI, Subsection IWE and the 10 CFR Part 50, Appendix J Programs. During refueling activities, the exterior surface of the stainless steel fuel transfer tubes and associated components are exposed to a treated water environment. The aging effect of cracking due to SCC and use of the Water Chemistry Program is addressed in Table 3.3.1, Item 3.3.1-90, for the stainless steel fuel transfer tubes and associated components.

Penetration bellows are installed outside the RB and are not part of the Containment pressure boundary; therefore, they are not in the scope of License Renewal.

3.5.2.2.1.8 Cracking Due to Cyclic Loading

Cracking due to cyclic loading is managed by the ASME Section XI, Subsection IWE and 10 CFR Part 50, Appendix J Programs for the penetration sleeves, dissimilar metal welds, and fuel transfer tubes and cover plates in the RB.

No operating experience has been found for aging effect of fine cracking of these components and CR-3 does not expect fine cracking of the penetration sleeves, dissimilar metal welds, fuel transfer tubes, and cover plates to occur. The supplemental aging effect of fine cracking is a result of cyclic loading or fatigue. Use of the ASME Section XI, Subsection IWE Program together with the 10 CFR Part 50, Appendix J Program is adequate for monitoring the aging effects for penetrations sleeves, dissimilar metal welds, and fuel transfer tubes due to cyclic loading.

Penetration bellows are installed outside the RB and are not part of the Containment pressure boundary; therefore, they are not in the scope of License Renewal.

3.5.2.2.1.9 Loss of Material (Scaling, Cracking, and Spalling) Due to Freeze-Thaw

Loss of material due to freeze-thaw is not an applicable effect, because CR-3 is located in a negligible weathering region per ASTM C33 and is not subject to freeze-thaw. Examinations of the accessible concrete performed by the ASME Section XI, Subsection IWL Program have not identified any aging effects due to freeze-thaw.

3.5.2.2.1.10 Cracking Due to Expansion and Reaction with Aggregate, and Increase in Porosity and Permeability, Due to Leaching of Calcium Hydroxide

Cracking due to expansion and reaction with aggregate is not an applicable aging effect. Fine and coarse aggregates were tested with each brand of cement for possible alkali reaction in accordance with ASTM C227; and aggregates did not react within the reinforced concrete. In addition, concrete was constructed to ACI 301-66, which provides guidance similar to ACI 201.2R for producing high density, low permeability concrete.

For increase in porosity and permeability due to leaching of calcium hydroxide, concrete was constructed to ACI 301-66, which provides guidance similar to ACI 201.2R for producing high density, low permeability concrete. However, an increase in porosity and permeability due to leaching of calcium hydroxide is conservatively considered to be an aging effect requiring management, because minor indications of leaching in below grade concrete exists in the RB tendon access gallery. The aging effect of change in material properties has been assigned, as equivalent to an increase in porosity and permeability, and is managed by the ASME Section XI, Subsection IWL Program.

3.5.2.2.2 Safety Related and Other Structures and Component Supports

3.5.2.2.2.1 Aging of Structures Not Covered by Structures Monitoring Program

Further evaluation is provided because the following structure/aging effect combinations are not covered by the Structures Monitoring Program:

1. Loss of material (i.e., spalling and scaling) and cracking due to freeze-thaw for NUREG-1801 Group 1-3, 5, and 7-9 structures is not applicable; because CR-3 is located in a negligible weathering region per ASTM C33 and is not subject to freeze-thaw.

2. Cracking due to expansion and reaction with aggregates for Group 1-5 and 7-9 structures is not applicable; because CR-3 fine and coarse aggregates were tested with each brand of cement for possible alkali reaction in accordance with ASTM C227, and aggregates did not react within the reinforced concrete. In addition, concrete was constructed to ACI 301-66, which provides guidance similar to ACI 201.2R for producing high density, low permeability concrete mix designs.

3. Cracking and distortion due to increased stress levels from settlement for Group 1-3 and 5-9 structures is applicable with the exception of the Group 8 Borated Water Storage Tank Foundation and Shield Wall, which is supported on the AB and is not in a soil environment.

4. Reduction in foundation strength, cracking, differential settlement due to erosion of porous concrete subfoundation for Groups 1-3 and 5-9 structures is not applicable because CR-3 does not have a porous concrete subfoundation; and a dewatering system is not relied upon to control erosion of cement from porous concrete.

Further evaluation is provided because the following structure/aging effect combination is not covered by the Structures Monitoring or ASME Section XI, Subsection IWF Program:

Lock up due to wear for Lubrite® radial beam seats in BWR drywell, RPV support shoes for PWR with nozzle supports, steam generator supports, and other sliding support bearings and sliding support surfaces is not applicable because CR-3 does not utilize Lubrite in these applications.

The Structures Monitoring Program is utilized to manage the aging effects due to corrosion of embedded steel, aggressive chemical attack, settlement for concrete, and loss of material for steel elements.

3.5.2.2.2.2 Aging Management of Inaccessible Areas

1. Freeze-Thaw

Loss of material and cracking due to freeze-thaw is not an applicable effect because CR-3 is located in a negligible weathering region per ASTM C33 which is not subject to freeze-thaw. Examinations of the accessible concrete performed by the Structures Monitoring Program have not identified any aging effects due to freeze-thaw.

2. Reaction with Aggregates

Cracking due to expansion and reaction with aggregate is not an applicable effect; because CR-3 fine and coarse aggregates were tested with each brand of cement for possible alkali reaction in accordance with ASTM C227, and aggregates did not react within the reinforced concrete. In addition, concrete was constructed to ACI 301-66, which provides guidance similar to ACI 201.2R for producing high density, low permeability concrete mix designs.

3. Increased Stress Levels from Settlement and Erosion of Porous Concrete

The aging effect of cracking and distortion due to increased stress levels due to settlement is managed by the Structures Monitoring Program with the exception of the Group 3 Borated Water Storage Tank Foundation and Shield Wall which is supported on the AB roof slab and is not in a soil environment. A de-watering system is not relied upon for control of settlement.

The structures were founded on 1,500 psi fill concrete placed over competent existing limerock (over crushed grouted limerock for the RB), cement-grouted limerock (Control Complex, Intermediate Building), or compacted backfill. A settlement analysis for the RB determined the upper limit of total settlement was found to be on the order of 0.875 in., but that all but a very small fraction of settlement would occur during construction. No cracking due to settlement is expected or has been observed; however, the Structures Monitoring Program examines concrete for cracking due to settlement and is credited for managing the aging effect of cracking.

The NUREG-1801 item regarding erosion of porous concrete subfoundations is not applicable. CR-3 does not have a porous concrete subfoundation.

4. Aggressive Chemical Attack and Corrosion of Embedded Steel

Groundwater chemistry is non-aggressive at CR-3 based on groundwater samples taken from two plant wells in 2007 as follows:

- Well CR3-1S – pH 7.19, chlorides 450 ppm, sulfates 140 ppm, phosphates < 0.5 ppm; and
- Well CR3-2- pH 7.64, chlorides 37 ppm, sulfates 11 ppm, phosphates < 0.5 ppm.

However, concrete cracking, loss of material, and change in material properties are conservatively assumed to be applicable to CR-3 in the soil environment.

The Structures Monitoring Program will continue to monitor groundwater on a periodic basis including consideration of potential seasonal variations. The Structures Monitoring Program will also continue to examine the exposed portions of the below-grade concrete when excavated for any reason.

5. Leaching of Calcium Hydroxide

Concrete was constructed to ACI 301-66, which provides guidance similar to ACI 201.2R for producing high density, low permeability concrete mix designs. However, an increase in porosity and permeability due to leaching of calcium hydroxide is conservatively considered to be an aging effect requiring aging management because of the existence of minor indications of leaching in below-grade concrete in the RB tendon access gallery. Therefore, any below grade concrete in the scope of License Renewal will be examined whenever excavated for any reason in accordance with the Structures Monitoring Program.

3.5.2.2.2.3 Reduction of Strength and Modulus of Concrete Structures Due to Elevated Temperature

The NUREG-1801 item regarding concrete degradation from elevated temperatures is not applicable, because neither the RB non-pressure boundary concrete nor the concrete structures outside the RB exceed the specified temperature limits.

The RB is maintained below an average ambient temperature of 130°F with the RB Cooling System; and the area between the primary shield wall and the reactor vessel is maintained at a temperature below 200°F. The local area inside "D"-Ring above 119 ft. elevation near the top of the pressurizer is subject to a temperature of 164.3°F but the area is open to the RB general area environment and is not enclosed.

The normal temperature for structures outside the RB vary from 140°F in the Intermediate Building to 85°F in the Control Complex with no general areas temperatures exceeding 150°F or local area temperatures exceeding 200°F.

RB pressure boundary concrete is discussed in Subsection 3.5.2.2.1.3.

3.5.2.2.2.4 Aging Management of Inaccessible Areas for Group 6 Structures

1. Aggressive Chemical Attack and Corrosion of Embedded Steel

Groundwater chemistry is non-aggressive at CR-3 based on groundwater samples taken from two plant wells in 2007 as follows:

- Well CR3-1S – pH 7.19, chlorides 450 ppm, sulfates 140 ppm, phosphates < 0.5 ppm; and
- Well CR3-2- pH 7.64, chlorides 37 ppm, sulfates 11 ppm, phosphates < 0.5 ppm.

However, concrete cracking, loss of material, and change in material properties are conservatively assumed to be applicable to CR-3 in the soil environment.

The Structures Monitoring Program will continue to monitor groundwater on a periodic basis including consideration of potential seasonal variations during the period of extended operation. The Structures Monitoring Program will also continue to examine the exposed portions of the below-grade concrete when excavated for any reason.

2. Freeze-Thaw

Loss of material due to freeze-thaw is not an applicable effect because CR-3 is located in a negligible weathering region per ASTM C33 which is not subject to freeze-thaw. Examinations of the accessible concrete performed by the Structures Monitoring Program have not identified any aging effects due to freeze-thaw.

3. Reaction with Aggregates and Leaching of Calcium Hydroxide

Cracking due to expansion and reaction with aggregate is not an applicable aging effect. Fine and coarse aggregates were tested with each brand of cement for possible alkali reaction in accordance with ASTM C227 and aggregates did not react within the reinforced concrete. In addition, concrete was constructed to ACI 301-66, which provides guidance similar to ACI 201.2R for producing high density, low permeability concrete mix designs.

For increase in porosity and permeability due to leaching of calcium hydroxide, concrete was constructed to ACI 301-66, which provides similar guidance to produce high density, low permeability concrete as ACI 201.2R. However, an increase in porosity and permeability due to leaching of calcium hydroxide is conservatively considered to be an aging effect requiring aging management because of the existence of minor indications of leaching in below-grade concrete in the RB tendon access gallery. The aging effect of change in material properties has been assigned as equivalent to an increase in porosity and permeability and is managed by the Structures Monitoring Program..

3.5.2.2.2.5 Cracking Due to Stress Corrosion Cracking and Loss of Material Due to Pitting and Crevice Corrosion

Cracking due to stress corrosion cracking and loss of material due to pitting and crevice corrosion of stainless steel tank liners is not applicable to CR-3. CR-3 does not have tanks with stainless steel liners. Aging management of tanks is addressed with the mechanical system in which the tanks are located.

3.5.2.2.2.6 Aging of Supports Not Covered by Structures Monitoring Program

NUREG-1801 recommends further evaluation of certain component support/aging effect combinations if they are not covered by the structures monitoring program including (1) loss of material due to general and pitting corrosion for Groups B2-B5 supports; (2) reduction in concrete anchor capacity due to degradation of the surrounding concrete for Groups B1-B5 supports; and (3) reduction/loss of isolation function due to degradation of vibration isolation elements for Group B4 supports. The following apply to CR-3 supports:

1. The Structures Monitoring Program is used to manage loss of material due to general and pitting corrosion for Groups B2-B5 supports for CR-3 structures within the scope of License Renewal.

2. The Structures Monitoring Program is used to manage reduction in concrete anchor capacity due to degradation of the surrounding concrete, for Groups B1-B5 supports for CR-3 structures within the scope of License Renewal.

3. Reduction/loss of isolation function due to degradation of vibration isolation elements for Group B4 supports (i.e., NUREG-1801, Volume 2, related item T-31) is applicable only in the Control Complex, Intermediate Building, Machine Shop, and Turbine Building for ventilation equipment.

3.5.2.2.2.7 Cumulative Fatigue Damage Due to Cyclic Loading

Fatigue of component support members, anchor bolts, and welds for Groups B1.1, B1.2, and B1.3 component supports is a TLAA as defined in 10 CFR 54.3 only if a CLB fatigue analysis exists.

There are no fatigue analyses in the CLB applicable to component supports; therefore, cumulative fatigue damage of component supports is not a TLAA as defined in 10 CFR 54.3.

3.5.2.2.3 <u>Quality Assurance for Aging Management of Non-Safety Related Components</u>

QA provisions applicable to License Renewal are discussed in Section B.1.3.

3.5.2.3 Time-Limited Aging Analysis

The Time-Limited Aging Analyses (TLAA) identified below are associated with the Containments, Structures, and Component Support components. The section of the application that contains the TLAA review results is indicated in parenthesis.

1. Tendon Stress Relaxation (Section 4.5)
2. Expansion Bellows Cyclic Fatigue (Section 4.6)
3. Bedrock Dissolution from Groundwater (Section 4.7)

3.5.3 CONCLUSIONS

The Containments, Structures, and Component Support components/commodities having aging effects requiring management have been evaluated, and aging management programs have been selected to manage the aging effects. A description of the aging management programs is provided in Appendix B, along with a demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the demonstration provided in Appendix B, the effects of aging will be adequately managed so that there is reasonable assurance that the intended functions of Containments, Structures, and Component Support components/ commodities will be maintained consistent with the CLB during the period of extended operation.

TABLE 3.5.1 SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
PWR Concrete (Reinforced and Prestressed) and Steel Containment BWR Concrete (Mark II and III) and Steel (Mark I, II, and III) Containment					
3.5.1-01	Concrete elements: walls, dome, basemat, ring girder, buttresses, containment (as applicable).	Aging of accessible and inaccessible concrete areas due to aggressive chemical attack, and corrosion of embedded steel	ISI (IWL) and for inaccessible concrete, an examination of representative samples of below-grade concrete and periodic monitoring of groundwater if environment is non-aggressive. A plant specific program is to be evaluated if environment is aggressive.	Yes, plant-specific, if the environment is aggressive	Consistent with NUREG-1801. The CR-3 groundwater is non-aggressive and no further evaluation is required. Refer to Subsection 3.5.2.2.1.1 for additional information regarding groundwater parameters and examination of representative samples of below grade concrete for the RB.
3.5.1-02	Concrete elements; All	Cracks and distortion due to increased stress levels from settlement	Structures Monitoring Program. If a de-watering system is relied upon for control of settlement, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	Yes, if not within the scope of the applicant's structures monitoring program or a de-watering system is relied upon	Consistent with NUREG-1801. Aging effects due to settlement are managed by the Structures Monitoring Program and a de-watering system is not relied upon for control of settlement. Therefore, further evaluation is not required. Additional information regarding settlement is provided in Subsection 3.5.2.2.1.2.
3.5.1-03	Concrete elements: foundation, sub-foundation	Reduction in foundation strength, cracking, differential settlement due to erosion of porous concrete subfoundation	Structures Monitoring Program. If a de-watering system is relied upon to control erosion of cement from porous concrete subfoundations, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	Yes, if not within the scope of the applicant's structures monitoring program or a de-watering system is relied upon	The aging mechanism erosion of porous concrete subfoundation is not applicable to the RB. Refer to evaluation in Subsection 3.5.2.2.1.2.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-04	Concrete elements: dome, wall, basemat, ring girder, buttresses, containment, concrete fill-in annulus (as applicable)	Reduction of strength and modulus due to elevated temperature	Plant-specific	Yes, plant-specific if temperature limits are exceeded	Reduction of strength and modulus due to elevated temperature is not applicable to the RB. Refer to the evaluation in Subsection 3.5.2.2.1.3.
3.5.1-05	BWR Only				
3.5.1-06	Steel elements: steel liner, liner anchors, integral attachments	Loss of material due to general, pitting and crevice corrosion	ISI (IWE) and 10 CFR Part 50, Appendix J	Yes, if corrosion is significant for inaccessible areas	Consistent with NUREG-1801. Loss of material due to corrosion is not significant for inaccessible areas (embedded containment steel liner). Refer to the evaluation in Subsection 3.5.2.2.1.4.
3.5.1-07	Prestressed containment tendons	Loss of prestress due to relaxation, shrinkage, creep, and elevated temperature	TLAA evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Consistent with NUREG-1801. A TLAA is evaluated in accordance with 10 CFR 54.21(c) for applicable components. Refer to the evaluation in Subsection 3.5.2.2.1.5.
3.5.1-08	BWR Only				
3.5.1-09	Steel, stainless steel elements, dissimilar metal welds: penetration sleeves, penetration bellows; suppression pool shell, unbraced downcomers	Cumulative fatigue damage (CLB fatigue analysis exists)	TLAA evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Consistent with NUREG-1801. A TLAA is evaluated in accordance with 10 CFR 54.21(c) for applicable components. Refer to the evaluation in Subsection 3.5.2.2.1.6.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-10	Stainless steel penetration sleeves, penetration bellows, dissimilar metal welds	Cracking due to stress corrosion cracking	ISI (IWE) and 10 CFR Part 50, Appendix J and additional appropriate examinations/evaluations for bellows assemblies and dissimilar metal welds	Yes, detection of aging effects is to be evaluated	Cracking due to SCC is not an applicable effect for the penetration sleeves and dissimilar metal welds in an Air-Indoor environment. Refer to the evaluation in Subsection 3.5.2.2.1.7 for a discussion of these components and the external surface of the fuel transfer tubes and associated components in a treated water environment.
3.5.1-11	BWR Only				
3.5.1-12	Steel, stainless steel elements, dissimilar metal welds: penetration sleeves, penetration bellows; suppression pool shell, unbraced downcomers	Cracking due to cyclic loading	ISI (IWE) and 10 CFR Part 50, Appendix J supplemented to detect fine cracks	Yes, detection of aging effects is to be evaluated	The aging effect of cracking for the penetration sleeves, dissimilar metal welds, and fuel transfer tubes and cover plates in the RB are managed by the ASME Section XI, Subsection IWE and 10 CFR Part 50 Appendix J Programs. However, CR-3 does not supplement the programs to detect fine cracks. Refer to evaluation in Subsection 3.5.2.2.1.8.
3.5.1-13	BWR Only				
3.5.1-14	Concrete elements: dome, wall, basemat ring girder, buttresses, containment (as applicable)	Loss of material (Scaling, cracking, and spalling) due to freeze-thaw	ISI (IWL). Evaluation is needed for plants that are located in moderate to severe weathering conditions (weathering index >100 day-inch/yr) (NUREG-1557).	Yes, for inaccessible areas of plants located in moderate to severe weathering conditions	Freeze-thaw is not applicable to CR-3. Refer to evaluation in Subsection 3.5.2.2.1.9.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-15	Concrete elements: walls, dome, basemat, ring girder, buttresses, containment, concrete fill-in annulus (as applicable).	Increase in porosity, permeability due to leaching of calcium hydroxide; cracking due to expansion and reaction with aggregate	ISI (IWL) for accessible areas. None for inaccessible areas if concrete was constructed in accordance with the recommendations in ACI 201.2R.	Yes, if concrete was not constructed as stated for inaccessible areas	This NUREG-1801 item is not applicable with respect to cracking due to expansion and reaction with aggregate. This item is consistent with NUREG-1801 with respect to increase in porosity and permeability due to leaching of calcium hydroxide. Refer to the evaluation in Subsection 3.5.2.2.1.10.
3.5.1-16	Seals, gaskets, and moisture barriers	Loss of sealing and leakage through containment due to deterioration of joint seals, gaskets, and moisture barriers (caulking, flashing, and other sealants)	ISI (IWE) and 10 CFR Part 50, Appendix J	No	Consistent with NUREG-1801. The ASME Section XI, Subsection IWE and 10 CFR Part 50 Appendix J Programs are used to manage the aging effects of cracking and change in material properties which result in loss of sealing and leakage through the RB due to deterioration of joint seals, gaskets; and moisture barrier at the RB liner to concrete slab interface. The ISI (IWE) Program is applicable to the Moisture Barrier at the RB liner-to-concrete floor slab interface. The 10 CFR Part 50, Appendix J program is applicable to the penetration Seals and Gaskets.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-17	Personnel airlock, equipment hatch and CRD hatch locks, hinges, and closure mechanisms	Loss of leak tightness in closed position due to mechanical wear of locks, hinges and closure mechanisms	10 CFR Part 50, Appendix J and Plant Technical Specifications	No	Consistent with NUREG-1801. The 10 CFR Part 50 Appendix J Program is used to confirm loss of leak tightness of Personnel Airlocks and the Equipment Hatch in closed position in accordance with the CR-3 Technical Specifications
3.5.1-18	Steel penetration sleeves and dissimilar metal welds; personnel airlock, equipment hatch and CRD hatch	Loss of material due to general, pitting, and crevice corrosion	ISI (IWE) and 10 CFR Part 50, Appendix J	No	Consistent with NUREG-1801. The ASME Section XI, Subsection IWE and 10 CFR Part 50 Appendix J Programs are used to manage loss of material due to corrosion.
3.5.1-19	BWR Only				
3.5.1-20	BWR Only				
3.5.1-21	BWR Only				
3.5.1-22	Prestressed containment: tendons and anchorage components	Loss of material due to corrosion	ISI (IWL)	No	Consistent with NUREG-1801. The ASME Section XI, Subsection IWE Program is used to manage loss of material due to corrosion.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
Safety Related and Other Structures; and Component Supports					
3.5.1-23	All Groups except Group 6: interior and above grade exterior concrete	Cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel	Structures Monitoring Program	Yes, if not within the scope of the applicant's structures monitoring program	Consistent with NUREG-1801. The Structures Monitoring Program is used to manage accessible concrete of the non-pressure boundary RB concrete (including the Equipment Access Structure and Tendon Gallery) and the structures outside the RB. See Section 3.5.2.2.2.1 for further discussion.
3.5.1-24	All Groups except Group 6: interior and above grade exterior concrete	Increase in porosity and permeability, cracking, loss of material (spalling, scaling) due to aggressive chemical attack	Structures Monitoring Program	Yes, if not within the scope of the applicant's structures monitoring program	Consistent with NUREG-1801. The Structures Monitoring Program is used to manage accessible concrete of the non-pressure boundary RB concrete (including the Equipment Access Structure and the Tendon Gallery) and the structures outside the RB. See Section 3.5.2.2.2.1 for further discussion.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-25	All Groups except Group 6: steel components: all structural steel	Loss of material due to corrosion	Structures Monitoring Program. If protective coatings are relied upon to manage the effects of aging, the structures monitoring program is to include provisions to address protective coating monitoring and maintenance.	Yes, if not within the scope of the applicant's structures monitoring program	Consistent with NUREG-1801. The Structures Monitoring Program is used to manage loss of material due to corrosion for the group Steel Components: All structural steel which includes the steel inside the RB, the Equipment Access Structure, and the structures outside the RB. Protective coatings are not relied upon to manage the effects of aging. See Section 3.5.2.2.2.1 for further discussion.
3.5.1-26	All Groups except Group 6: accessible and inaccessible concrete: foundation	Loss of material (spalling, scaling) and cracking due to freeze-thaw	Structures Monitoring Program. Evaluation is needed for plants that are located in moderate to severe weathering conditions (weathering index >100 day-inch/yr) (NUREG-1557).	Yes, if not within the scope of the applicant's structures monitoring program or for inaccessible areas of plants located in moderate to severe weathering conditions	This NUREG-1801 item is not applicable. See Subsections 3.5.2.2.2.1 and 3.5.2.2.2.2.1 for further discussion.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-27	All Groups except Group 6: accessible and inaccessible interior/exterior concrete	Cracking due to expansion due to reaction with aggregates	Structures Monitoring Program None for inaccessible areas if concrete was constructed in accordance with the recommendations in ACI 201.2R-77.	Yes, if not within the scope of the applicant's structures monitoring program or concrete was not constructed as stated for inaccessible areas	This NUREG-1801 item is not applicable. See Subsections 3.5.2.2.2.1 and 3.5.2.2.2.2.2 for further discussion.
3.5.1-28	Groups 1-3, 5-9: All	Cracks and distortion due to increased stress levels from settlement	Structures Monitoring Program. If a de-watering system is relied upon for control of settlement, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	Yes, if not within the scope of the applicant's structures monitoring program or a de-watering system is relied upon	Consistent with NUREG-1801, with the exception of the Borated Water Storage Tank Foundation and Shield Wall. Aging effects due to settlement are managed by the Structures Monitoring Program except for the Borated Water Storage Tank Foundation and Shield Wall which is supported on the Auxiliary Building roof slab, not located in a soil environment, and not subject to settlement. A de-watering system is not relied upon for control of settlement. See Subsections 3.5.2.2.2.1 and 3.5.2.2.2.2.3 for further discussion.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-29	Groups 1-3, 5-9: foundation	Reduction in foundation strength, cracking, differential settlement due to erosion of porous concrete subfoundation	Structures Monitoring Program. If a de-watering system is relied upon for control of settlement, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	Yes, if not within the scope of the applicant's structures monitoring program or a de-watering system is relied upon	This NUREG-1801 item is not applicable. CR-3 does not have a porous concrete subfoundation, and a dewatering system is not relied upon to control erosion of cement from porous concrete. See Subsections 3.5.2.2.2.1 and 3.5.2.2.2.2.3 for further discussion.
3.5.1-30	Group 4: Radial beam seats in BWR drywell; RPV support shoes for PWR with nozzle supports; Steam generator supports	Lock-up due to wear	ISI (IWF) or Structures Monitoring Program	Yes, if not within the scope of ISI or structures monitoring program	This NUREG-1801 item is not applicable. Lubrite plates are not utilized in these applications. See Subsections 3.5.2.2.2.1 for further discussion.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-31	Groups 1-3, 5, 7-9: below-grade concrete components, such as exterior walls below grade and foundation	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)/ aggressive chemical attack; Cracking, loss of bond, and loss of material (spalling, scaling)/ corrosion of embedded steel	Structures monitoring Program; Examination of representative samples of below-grade concrete, and periodic monitoring of groundwater, if the environment is non-aggressive. A plant specific program is to be evaluated if environment is aggressive.	Yes, plant-specific, if environment is aggressive	Consistent with NUREG-1801. The Structures Monitoring Program is used to manage accessible concrete of the non-pressure boundary concrete of the RB (i.e., the Equipment Access Structure and the Tendon Gallery), and the structures outside the RB. This item is not applicable to the BWST because the structure is located on the Auxiliary Building concrete roof slab and all the concrete structure is above grade. Further evaluation and a plant specific program are required if the environment is aggressive. The environment is non-aggressive as documented in Subsection 3.5.2.2.2.2.4.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-32	Groups 1-3, 5, 7-9: exterior above and below grade reinforced concrete foundations	Increase in porosity and permeability, loss of strength due to leaching of calcium hydroxide.	Structures Monitoring Program for accessible areas. None for inaccessible areas if concrete was constructed in accordance with the recommendations in ACI 201.2R-77.	Yes, if concrete was not constructed as stated for inaccessible areas	Consistent with NUREG-1801. The Structures Monitoring Program is used to manage accessible concrete of the non-pressure boundary concrete of the RB (Equipment Access Structure and the Tendon Gallery), and the structures outside the RB. See Subsections 3.5.2.2.2.2.5 for further discussion of inaccessible concrete and ACI Codes used for concrete mix designs.
3.5.1-33	Groups 1-5: concrete	Reduction of strength and modulus due to elevated temperature	Plant-specific	Yes, plant-specific if temperature limits are exceeded	This NUREG-1801 item is not applicable. The concrete for the non-pressure boundary of the RB (including the Equipment Access Structure and the Tendon Gallery), and the structures outside the RB do not exceed the specified temperature limits specified for general area or local area concrete. Additional information regarding reduction of strength and modulus due to elevated temperature is provided in Subsection 3.5.2.2.2.3.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-34	Group 6: Concrete; all	Cracking, loss of bond, loss of material due to corrosion of embedded steel; increase in porosity and permeability, cracking, loss of material due to aggressive chemical attack	Inspection of Water-Control Structures Assoc with Nuclear Power Plants and for inaccessible concrete, exam of rep. samples of below-grade concrete, and periodic monitoring of groundwater, if environment is non-aggressive. Plant specific if environment is aggressive.	Yes, plant-specific if environment is aggressive	Consistent with NUREG-1801 for material, environment, and aging effect, but the Structures Monitoring Program is credited as the applicable aging management program as allowed by NUREG 1801, Section XI.S7. The Structures Monitoring Program meets the requirements of RG 1.127, Inspection of Water-Control Structures. Exposed portions of below-grade concrete will be examined under the provisions of the Structures Monitoring Program when excavated for any reason. Refer to the additional information in Subsection 3.5.2.2.2.4.1.
3.5.1-35	Group 6: exterior above and below grade concrete foundation	Loss of material (spalling, scaling) and cracking due to freeze-thaw	Inspection of Water-Control Structures Associated with Nuclear Power Plants. Evaluation is needed for plants that are located in moderate to severe weathering conditions (weathering index >100 day-inch/yr) (NUREG-1557).	Yes, for inaccessible areas of plants located in moderate to severe weathering conditions	This NUREG-1801 item is not applicable. Additional information is provided in Subsection 3.5.2.2.2.4.2.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-36	Group 6: all accessible/ inaccessible reinforced concrete	Cracking due to expansion/ reaction with aggregates	Accessible areas: Inspection of Water-Control Structures Associated with Nuclear Power Plants. None for inaccessible areas if concrete was constructed in accordance with the recommendations in ACI 201.2R-77.	Yes, if concrete was not constructed as stated for inaccessible areas	This NUREG-1801 item is not applicable. See Section 3.5.2.2.2.4.3 for further discussion.
3.5.1-37	Group 6: exterior above and below grade reinforced concrete foundation interior slab	Increase in porosity and permeability, loss of strength due to leaching of calcium hydroxide	For accessible areas, Inspection of Water-Control Structures Associated with Nuclear Power Plants. None for inaccessible areas if concrete was constructed in accordance with the recommendations in ACI 201.2R-77.	Yes, if concrete was not constructed as stated for inaccessible areas	Consistent with NUREG-1801 for material, environment, and aging effect, but the Structures Monitoring Program is credited as the applicable aging management program as allowed by NUREG 1801, Section XI.S7. The Structures Monitoring Program meets the requirements of RG 1.127, Inspection of Water-Control Structures. The Structures Monitoring Program is used to manage accessible concrete. See Subsections 3.5.2.2.2.4.3 for further discussion of inaccessible concrete and ACI Codes used for concrete mix designs.
3.5.1-38	Groups 7, 8: Tank liners	Cracking due to stress corrosion cracking; loss of material due to pitting and crevice corrosion	Plant-specific	Yes, plant specific	This NUREG-1801 item is not applicable. See Section 3.5.2.2.2.5 for further discussion.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-39	Support members; welds; bolted connections; support anchorage to building structure	Loss of material due to general and pitting corrosion	Structures Monitoring Program	Yes, if not within the scope of the applicant's structures monitoring program	Consistent with NUREG-1801. The Structures Monitoring Program is used to manage loss of material due to general and pitting corrosion of Group B2-B5 supports for CR-3 structures with Refer to the information in Subsection 3.5.2.2.2.6.
3.5.1-40	Building concrete at locations of expansion and grouted anchors; grout pads for support base plates	Reduction in concrete anchor capacity due to local concrete degradation/ service-induced cracking or other concrete aging mechanisms	Structures Monitoring Program	Yes, if not within the scope of the applicant's structures monitoring program	Consistent with NUREG-1801. The Structures Monitoring Program is used to manage reduction in concrete anchor capacity due to local concrete degradation / service-induced cracking or other concrete aging for CR-3 structures within the scope of License Renewal. Refer to the information in Subsection 3.5.2.2.2.6. Note that Group B1.3 is applicable to a BWR and is not applicable to CR-3.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-41	Vibration isolation elements	Reduction or loss of isolation function/ radiation hardening, temperature, humidity, sustained vibratory loading	Structures Monitoring Program	Yes, if not within the scope of the applicant's structures monitoring program	Consistent with NUREG-1801. The Structures Monitoring Program is used to manage the reduction or loss of isolation function for non-metallic vibration isolation elements within the scope of License Renewal in the Control Complex, Intermediate Building, Machine Shop, and the Turbine Building for ventilation equipment. Refer to the information in Subsection 3.5.2.2.2.6.
3.5.1-42	Groups B1.1, B1.2, and B1.3: support members: anchor bolts, welds	Cumulative fatigue damage (CLB fatigue analysis exists)	TLAA evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	This NUREG-1801 item is not applicable. A fatigue analysis does not exist in the CLB for the supports for Groups B1.1 and B1.2 at CR-3. Therefore, no TLAA evaluation is necessary as specified in NUREG-1801. Group B1.3 is applicable to a BWR and not applicable for a PWR. Refer to the information in Subsection 3.5.2.2.2.7.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-43	Groups 1-3, 5, 6: all masonry block walls	Cracking due to restraint shrinkage, creep, and aggressive environment	Masonry Wall Program	No	Consistent with NUREG-1801. The Masonry Wall Program is used to manage cracking due to restraint shrinkage, creep, and aggressive environment for the structures with masonry block walls (i.e., the Auxiliary Building, Control Complex, Fire Service Pump House, CR-3 Switchyard Relay Building, and Turbine Building).
3.5.1-44	Group 6 elastomer seals, gaskets, and moisture barriers	Loss of sealing due to deterioration of seals, gaskets, and moisture barriers (caulking, flashing, and other sealants)	Structures Monitoring Program	No	Consistent with NUREG-1801. The Structures Monitoring Program is used to manage aging effects of cracking and change in material properties for applicable structures which result in loss of sealing. These structures are not in Group 6, but the alignment is based on the same material, environment, aging effect and aging management program. This is applicable to the Auxiliary Building, Borated Water Storage Tank Foundation and Shield Wall, Control Complex, Diesel Generator Building, EFW Pump Building, Dedicated EFW Tank Enclosure Building, Fire Service Pump House, Intermediate Building, (continued)

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-44 (continued)	Group 6 elastomer seals, gaskets, and moisture barriers	Loss of sealing due to deterioration of seals, gaskets, and moisture barriers (caulking, flashing, and other sealants)	Structures Monitoring Program	No	Miscellaneous Structures, Switchyard Relay Building, Reactor Building, and Turbine Building. Cracking and change in material properties for elastomers results in loss of sealing and is considered an equivalent aging effect.
3.5.1-45	Group 6: exterior above and below grade concrete foundation; interior slab	Loss of material due to abrasion, cavitation	Inspection of Water-Control Structures Associated with Nuclear Power Plants	No	Consistent with NUREG-1801 for material, environment, and aging effect, but the Structures Monitoring Program is credited as the applicable aging management program as allowed by NUREG 1801, Section XI.S7. The Structures Monitoring Program meets the requirements of RG 1.127, Inspection of Water-Control Structures. The Structures Monitoring Program is used to manage concrete for loss of material due to concrete abrasion and cavitation for the Cable Bridge Structure, Circulating Water Intake Structure, Circulating Water Discharge Structure, and the Nuclear Service Seawater Pump Sump of the Auxiliary Building.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-46	Group 5: Fuel pool liners	Cracking due to stress corrosion cracking; loss of material due to pitting and crevice corrosion	Water Chemistry and Monitoring of spent fuel pool water level and level of fluid in the leak chase channel.	No	Consistent with NUREG-1801. Cracking due to SCC and loss of material due to pitting and crevice corrosion are managed by the Water Chemistry Program, and by monitoring the water level of the Spent Fuel Pool (SFP) and the fluid level in the leak chase test hopper. Plant Technical Specifications require monitoring of the spent fuel pool water level, and the leak chase test hoppers are monitored daily. The expansion bellows in the CR-3 SFP is also included based on the same material, environment, aging effect and aging management program. The SFP environmental conditions do not normally exceed the 140°F pool temperature threshold that can result in cracking due to the SCC for stainless steel components. However, CR-3 site-specific operating experience has determined that there is a potential for SCC of the stainless steel SFP Liner Plate. Susceptibility to SCC is generally limited to the stainless steels that have relatively high carbon content. Specifically, the SFP manufactured from (continued)

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-46 (contin-ued)	Group 5: Fuel pool liners	Cracking due to stress corrosion cracking; loss of material due to pitting and crevice corrosion	Water Chemistry and Monitoring of spent fuel pool water level and level of fluid in the leak chase channel.	No	Types 302 and 304 stainless steels can have carbon content that would increase susceptibility even for pool temperatures below the 140°F threshold. Therefore, the SFP Liner Plate will be considered to be susceptible to SCC. This NUREG-1801 table line item is specific to the SFP where spent fuel is stored. However, inside the RB, cracking due to SCC and loss of material due to corrosion for the Reactor Cavity Liner/Refueling Canal Liner/ Expansion Bellows is managed by the Water Chemistry Program during refueling outages when the Reactor Cavity/Refueling Canal is flooded. These commodities are included based on the same material, environment, aging effect and aging management program. Monitoring of spent fuel pool water level and level of fluid in the leak chase channel is not applicable inside the RB. Normally the Reactor Cavity Liner/Refueling Canal Liner/ Expansion Bellows are exposed to an Air-Indoor environment. No aging effects are (continued)

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-46 (contin-ued)	Group 5: Fuel pool liners	Cracking due to stress corrosion cracking; loss of material due to pitting and crevice corrosion	Water Chemistry and Monitoring of spent fuel pool water level and level of fluid in the leak chase channel.	No	anticipated for these stainless steel components in an air environment as indicated on Table 3.5.2-1 for the component/commodity Steel Components: Fuel Pool Liner. Refer to the discussion of SCC for the SFP Racks in Table line item 3.3.1-90.
3.5.1-47	Group 6: all metal structural members	Loss of material due to general (steel only), pitting and crevice corrosion	Inspection of Water-Control Structures Associated with Nuclear Power Plants. If protective coatings are relied upon to manage aging, protective coating monitoring and maintenance provisions should be included.	No	Consistent with NUREG-1801 for material, environment, and aging effect, but the Structures Monitoring Program is credited as the applicable aging management program as allowed by NUREG 1801, Section XI.S7. The Structures Monitoring Program meets the requirements of RG 1.127, Inspection of Water-Control Structures. The Structures Monitoring Program is used to manage the metal structural members (including the trash racks) at the Circulating Water Intake Structure for loss of material due to general, pitting and crevice corrosion.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-48	Group 6: earthen water control structures - dams, embankments, reservoirs, channels, canals, and ponds	Loss of material, loss of form due to erosion, settlement, sedimentation, frost action, waves, currents, surface runoff, seepage	Inspection of Water-Control Structures Associated with Nuclear Power Plants	No	Consistent with NUREG-1801 for material, environment, and aging effect, but the Structures Monitoring Program is credited as the applicable aging management program as allowed by NUREG 1801, Section XI.S7. The Structures Monitoring Program meets the requirements of RG 1.127, Inspection of Water-Control Structures. The Structures Monitoring Program is used to manage aging effects of loss of material and loss of form at the Intake Canal and the Wave Embankment Protection Structure.
3.5.1-49	BWR Only				
3.5.1-50	Groups B2, and B4: galvanized steel, aluminum, stainless steel support members; welds; bolted connections; support anchorage to building structure	Loss of material due to pitting and crevice corrosion	Structures Monitoring Program	No	Consistent with NUREG-1801. The Structures Monitoring Program is used to manage loss of material for galvanized steel, aluminum, and stainless steel due to corrosion for Groups B2 and B4 components. Other components are aligned with this group such as ”Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and other (continued)

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-50 (contin-ued)	Groups B2, and B4: galvanized steel, aluminum, stainless steel support members; welds; bolted connections; support anchorage to building structure	Loss of material due to pitting and crevice corrosion	Structures Monitoring Program	No	Miscellaneous Structures," "Siding," "Steel Components: All Structural Steel," "Door (Non-fire)," or "Racks, Panels, Cabinets, and Enclosure for Electrical Equipment and Instrumentation," because they have the same material, environment, aging effect and aging management program.
3.5.1-51	Group B1.1: high strength low-alloy bolts	Cracking due to stress corrosion cracking; loss of material due to general corrosion	Bolting Integrity	No	Consistent with NUREG-1801. The Bolting Integrity Program is used to manage cracking due to stress corrosion cracking and loss of material due to general corrosion for high strength (i.e., yield strength > 150 KSI) Reactor Coolant System anchor bolts in the RB. These high strength structural bolts are located in areas in the RB that are subject to wetting from RCS leakage or spray. Operating experience has not identified SCC or loss of material for these high strength bolts.
3.5.1-52	Groups B2, and B4: sliding support bearings and sliding support surfaces	Loss of mechanical function due to corrosion, distortion, dirt, overload, fatigue due to vibratory and cyclic thermal loads	Structures Monitoring Program	No	This NUREG-1801 item is not applicable. There are no NUREG-1801 Group III.B2 or III.B4 Lubrite or graphitic tool steel components used inside or outside of the RB at CR-3.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-53	Groups B1.1, B1.2, and B1.3: support members: welds; bolted connections; support anchorage to building structure	Loss of material due to general and pitting corrosion	ISI (IWF)	No	Consistent with NUREG-1801. The ASME Section XI, Subsection IWF Program is used to manage loss of material for steel components due to corrosion for Groups B1.1 and B1.2 components. Group B1.3 for BWR Containment Supports is not applicable.
3.5.1-54	Groups B1.1, B1.2, and B1.3: Constant and variable load spring hangers; guides; stops	Loss of mechanical function due to corrosion, distortion, dirt, overload, fatigue due to vibratory and cyclic thermal loads	ISI (IWF)	No	Consistent with NUREG-1801. The ASME Section XI, Subsection IWF Program is used to manage Loss of mechanical function due to corrosion, distortion, dirt, overload, and fatigue due to vibratory and cyclic thermal loads for Groups B1.1 and B1.2 components. Group B1.3 for BWR Containment Supports is not applicable.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-55	Steel, galvanized steel, and aluminum support members; welds; bolted connections; support anchorage to building structure	Loss of material due to boric acid corrosion	Boric Acid Corrosion	No	Consistent with NUREG-1801. The Boric Acid Corrosion Program is used to manage loss of material for carbon steel, galvanized carbon steel, and aluminum components due to contact with boric acid. Group B1.3 for BWR Containment Supports is not applicable, and Groups B1.1-8, B1.2-6, B1.3-6 and B4-6 are not applicable because they are not used at CR-3.
3.5.1-56	Groups B1.1, B1.2, and B1.3: Sliding surfaces	Loss of mechanical function due to corrosion, distortion, dirt, overload, fatigue due to vibratory and cyclic thermal loads	ISI (IWF)	No	This NUREG-1801 item is not applicable. Lubrite plates are not utilized in these applications for Groups B1.1 and B1.2. Group B1.3 for BWR Containment Supports is not applicable.
3.5.1-57	Groups B1.1, B1.2, and B1.3: Vibration isolation elements	Reduction or loss of isolation function/ radiation hardening, temperature, humidity, sustained vibratory loading	ISI (IWF)	No	This NUREG-1801 item is not applicable. Vibration isolation elements (non metallic) are not utilized in these applications for Groups B1.1 and B1.2. Also, Group B1.3 for BWR Containment Supports is not applicable.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-58	Galvanized steel and aluminum support members; welds; bolted connections; support anchorage to building structure exposed to air indoor uncontrolled	None	None	NA - No AEM or AMP	Consistent with NUREG-1801. Although they are not support members, some additional components (i.e., "Door (Non-Fire)," "Floor Drains," "Fire Hose Stations," "Steel Components: All structural steel," "Steel Components: Fuel Pool Liner," "Raised Floor," "Siding," and "Draft Stops") have been included in this item; based on use of the same material, environment, aging effect and aging management program.
3.5.1-59	Stainless steel support members; welds; bolted connections; support anchorage to building structure	None	None	NA - No AEM or AMP	Consistent with NUREG-1801. Although they are not support members, some additional components (i.e., "Door (Non-Fire)," "Floor Drains," "Fire Hose Stations," "Steel Components: All structural steel," "Steel Components: Fuel Pool Liner," "Raised Floor," "Siding," and "Draft Stops") have been included in this item based on use of the same material, environment, aging effect and aging management program. Group B1.3 for BWR Containment Supports is not applicable.

TABLE 3.5.2-1 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-2 C-7	Carbon Steel	Concrete	None	None			J, 501
		Stainless Steel	Concrete	None	None			J, 501
		Galvanized Steel	Concrete	None	None			J, 501
Cable Tray, Conduit, HVAC Ducts, Tube Track	C- 2 C- 7	Aluminum	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B2-6 (TP-3)	3.5.1-55	A
			Air - Indoor	None	None	III.B2-4 (TP-8)	3.5.1-58	A
		Carbon Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B2-11 (T-25)	3.5.1-55	A
			Air - Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Galvanized Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B2-6 (TP-3)	3.5.1-55	A
			Air - Indoor	None	None	III.B2-5 (TP-11)	3.5.1-58	A
		Stainless Steel	Borated Water Leakage	None	None	III.B2-9 (TP-4)	3.5.1-59	A
			Air - Indoor	None	None	III.B2-8 (TP-5)	3.5.1-59	A

TABLE 3.5.2-1 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Dome; Wall; Basemat; Ring Girder; Buttresses	C-1 C-2 C-3 C-4 C-6 C-7 C-8 C-12 C-14	Reinforced Concrete	Air - Outdoor	Change in Material Properties Cracking Loss of Material	ASME Section XI, Subsection IWL	II.A1-7 (C-05)	3.5.1-01	A
				Change in Material Properties Cracking Loss of Material	ASME Section XI, Subsection IWL	II.A1-4 (C-03)	3.5.1-01	A
				Cracking Loss of Material	ASME Section XI, Subsection IWL	VII.G-30 (A-92)	3.3.1-66	E
				Loss of Material	ASME Section XI, Subsection IWL	VII.G-31 (A-93)	3.3.1-67	E
			Air - Indoor	Change in Material Properties Cracking Loss of Material	ASME Section XI, Subsection IWL	II.A1-4 (C-03)	3.5.1-01	A
				Change in Material Properties Cracking Loss of Material	ASME Section XI, Subsection IWL	II.A1-7 (C-05)	3.5.1-01	A
				Cracking Loss of Material	ASME Section XI, Subsection IWL	VII.G-28 (A-90)	3.3.1-65	E
				Loss of Material	ASME Section XI, Subsection IWL	VII.G-29 (A-91)	3.3.1-67	E

TABLE 3.5.2-1 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Basemat	C-1 C-2 C-3 C-7 C-12	Reinforced Concrete	Soil	Change in Material Properties Cracking Loss of Material	ASME Section XI, Subsection IWL	II.A1-4 (C-03)	3.5.1-01	A
				Change in Material Properties Cracking Loss of Material	ASME Section XI, Subsection IWL	II.A1-7 (C-05)	3.5.1-01	A, 514
				Cracking	Structures Monitoring	II.A1-5 (C-37)	3.5.1-02	A
				Change in Material Properties	ASME Section XI, Subsection IWL	II.A1-6 (C-02)	3.5.1-15	A
Concrete: Above Grade	C-2 C-3 C-6 C-7 C-12 C-13 C-14	Reinforced Concrete	Air-Indoor	Change in Material Properties Cracking Loss of Material	Structures Monitoring	III.A3-9 III.A4-3 III.A5-9 (T-04)	3.5.1-23	A
				Change in Material Properties Cracking Loss of Material	Structures Monitoring	III.A3-10 III.A4-4 III.A5-10 (T-06)	3.5.1-24	A

TABLE 3.5.2-1 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Above Grade (continued)	C-2 C-3 C-6 C-7 C-12 C-13 C-14	Reinforced Concrete	Air-Indoor	Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.1-1 III.B1.2-1 III.B2-1 III.B3-1 III.B4-1 III.B5-1 (T-29)	3.5.1-40	A
			Air - Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
Concrete: Below Grade	C-2 C-3	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A

TABLE 3.5.2-1 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Foundation	C-2 C-3	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
Cranes	C-7	Carbon Steel	Air - Indoor	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A, 515
				Loss of Material / Wear (of Rail)	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A, 515
				None	None	VII.B-2 (A-06)	3.3.1-01	I
		Stainless Steel	Air - Indoor	None	None	III.B5-5 (TP-5)	3.5.1-59	C, 504

TABLE 3.5.2-1 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Expansion Bellows	C-15	Stainless Steel	Air - Indoor	Fatigue damage	TLAA	II.A3-4 (C-13)	3.5.1-09	C, 503
				None	None	III.B5-5 (TP-5)	3.5.1-59	C, 504
			Treated Water	Loss of Material Cracking (SCC)	Water Chemistry	III.A5-13 (T-14)	3.5.1-46	C, 505
Fire Barrier Assemblies	C-4	Fire Proofing Materials (Thermo-Lag)	Air - Indoor	Loss of Material Cracking / Delamination Separation	Fire Protection			J, 502
		Stainless Steel	Air - Indoor	None	None	III.B5-5 (TP-5)	3.5.1-59	C, 504
Floor Drains	C-8	Carbon Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-8 (TP-25)	3.5.1-55	C, 508
			Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 516
Insulation	C-3	Unibestos	Air - Indoor	None	None			J, 506

TABLE 3.5.2-1 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Penetration Sleeves	C-1 C-2 C-7	Carbon Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-8 (T-25)	3.5.1-55	C, 508
			Air - Indoor	Loss of Material	ASME Section XI Subsection IWE and 10 CFR Part 50, Appendix J	II.A3-1 (C-12)	3.5.1-18	A
				Cracking (Cyclic Loading)	ASME Section XI Subsection IWE and 10 CFR Part 50, Appendix J	II.A3-3 (C-14)	3.5.1-12	B, 513
		Stainless Steel	Borated Water Leakage	None	None	III.B5-6 (TP-4)	3.5.1-59	C, 504
			Air - Indoor	None	None	II.A3-2 (C-15)	3.5.1-10	I, 513
				Cracking (Cyclic Loading)	ASME Section XI Subsection IWE and 10 CFR Part 50, Appendix J	II.A3-3 (C-14)	3.5.1-12	B, 513

TABLE 3.5.2-1 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Personnel Airlock; Equipment Hatch	C-1 C-3 C-8	Carbon Steel	Air - Indoor	Loss of Leak Tightness in Closed Condition	10 CFR Part 50, Appendix J and Plant Technical Specifications	II.A3-5 (C-17)	3.5.1-17	A
				Loss of Material	ASME Section XI Subsection IWE and 10 CFR Part 50, Appendix J	II.A3-6 (C-16)	3.5.1-18	A
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures	C-2 C-7 C-11 C-12	Carbon Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-8 (T-25)	3.5.1-55	A
			Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (TP-30)	3.5.1-39	A
		Stainless Steel	Borated Water Leakage	None	None	III.B5-6 (TP-4)	3.5.1-59	A, 504
			Air - Indoor	None	None	III.B5-5 (TP-5)	3.5.1-59	A, 504
	C-2 C-7	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B5-7 (TP-30)	3.5.1-39	A
		Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B4-7 (TP-6)	3.5.1-50	C, 517

TABLE 3.5.2-1 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-2 C-3 C-7	Carbon Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B3-8 (T-25)	3.5.1-55	A
			Air - Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
		Galvanized Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B3-4 (TP-3)	3.5.1-55	A
			Air - Indoor	None	None	III.B3-3 (TP-11)	3.5.1-58	A
		Stainless Steel	Borated Water Leakage	None	None	III.B3-6 (TP-4)	3.5.1-59	A
			Air - Indoor	None	None	III.B3-5 (TP-5)	3.5.1-59	A
Seals and Gaskets	C-3 C-7	Elastomer	Air - Indoor	Cracking Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	A, 509
			Air - Outdoor	Cracking Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	A, 509
Seals, Gaskets, and Moisture Barriers	C-1 C-3	Elastomer	Air - Indoor	Cracking Change in Material Properties	ASME Section XI Subsection IWE and 10 CFR Part 50, Appendix J	II.A3-7 (C-18)	3.5.1-16	A, 507

TABLE 3.5.2-1 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steel Components: All Structural Steel	C-2 C-7 C-12	Carbon Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-8 (T-25)	3.5.1-55	C, 508
			Air - Indoor	Loss of Material	Structures Monitoring	III.A3-12 III.A4-5 (T-11)	3.5.1-25	A
		Fluorogold	Air - Indoor	Lock-up	Structures Monitoring			J, 510
				Change in Material Properties	Structures Monitoring			J, 510
Steel Components: Fuel Pool Liner	C-2 C-7 C-12	Stainless Steel	Borated Water Leakage	None	None	III.B5-6 (TP-4)	3.5.1-59	C, 504
			Air - Indoor	None	None	III.B5-5 (TP-5)	3.5.1-59	C, 504
			Treated Water	Loss of Material	Water Chemistry	III.A5-13 (T-14)	3.5.1-46	C, 512
				Cracking (SCC)	Water Chemistry	III.A5-13 (T-14)	3.5.1-46	A
Steel Elements: Liner; Liner Anchors; Integral Attachments	C-1 C-2 C-7 C-12	Carbon Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-8 (T-25)	3.5.1-55	C, 508
			Air - Indoor	Loss of Material	ASME Section XI Subsection IWE and 10 CFR Part 50, Appendix J	II.A1-11 (C-09)	3.5.1-06	A

TABLE 3.5.2-1 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Supports for ASME Class 1, 2, 3 Piping & Components	C-2 C-12	Carbon Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B1.1-14 III.B1.2-11 (T-25)	3.5.1-55	A
			Air - Indoor	Loss of Material	ASME Section XI, Subsection IWF	III.B1.1-13 III.B1.2-10 (T-24)	3.5.1-53	A
				Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.1-2 III.B1.2-2 (T-28)	3.5.1-54	A
		Stainless Steel	Borated Water Leakage	None	None	III.B1.1-10 III.B1.2-8 (TP-4)	3.5.1-59	A
			Air - Indoor	None	None	III.B1.1-9 III.B1.2-7 (TP-5)	3.5.1-59	A
		Fluorogold	Air - Indoor	Loss of Mechanical Function	ASME Section XI, Subsection IWF			J, 511
				Change in Material Properties	ASME Section XI, Subsection IWF			J, 511
Supports for EDG, HVAC System Components, and Other Miscellaneous Mechanical Equipment	C-2 C-7 C-12	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B4-10 (T-30)	3.5.1-39	A, 518

TABLE 3.5.2-1 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Supports for Non-ASME Piping & Components	C-7 C-12	Carbon Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B2-11 (T-25)	3.5.1-55	A
			Air - Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Stainless Steel	Borated Water Leakage	None	None	III.B2-9 (TP-4)	3.5.1-59	A
			Air - Indoor	None	None	III.B2-8 (TP-5)	3.5.1-59	A
Supports for Reactor Coolant System Primary Equipment	C-2 C-12	Carbon Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B1.1-14 (T-25)	3.5.1-55	A
			Air - Indoor	Loss of Material	ASME Section XI, Subsection IWF	III.B1.1-13 (T-24)	3.5.1-53	A
				Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.1-2 (T-28)	3.5.1-54	A
				Cracking (SCC)	Bolting Integrity	III.B1.1-3 (T-27)	3.5.1-51	A, 548
				Loss of Material	Bolting Integrity	III.B1.1-4 (TP-9)	3.5.1-51	A, 548
Tendons	C-2	Carbon Steel	Air -Indoor	Loss of Material	ASME Section XI, Subsection IWL	II.A1-10 (C-10)	3.5.1-22	A
				Loss of Prestress	TLAA	II.A1-9 (C-11)	3.5.1-07	A
			Air - Outdoor	Loss of Material	ASME Section XI, Subsection IWL	II.A1-10 (C-10)	3.5.1-22	A
				Loss of Prestress	TLAA	II.A1-9 (C-11)	3.5.1-07	A

TABLE 3.5.2-2 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-2 C-7	Carbon Steel	Reinforced Concrete	None	None			J, 501
Battery Racks	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-2 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B2-11 (T-25)	3.5.1-55	A
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B2-5 (TP-11)	3.5.1-58	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B2-6 (TP-3)	3.5.1-55	A
		Aluminum	Air - Indoor	None	None	III.B2-4 (TP-8)	3.5.1-58	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B2-6 (TP-3)	3.5.1-55	A
		Stainless Steel	Air - Indoor	None	None	III.B2-8 (TP-5)	3.5.1-59	A
			Borated Water Leakage	None	None	III.B2-9 (TP-4)	3.5.1-59	A
		Copper	Air - Indoor	None	None			J, 525
			Borated Water Leakage	None	None			J, 525

TABLE 3.5.2-2 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Above Grade	C-2 C-3 C-4 C-6 C-7 C-8 C-14	Reinforced Concrete	Air - Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Cracking Loss of Material	Fire Protection and Structures Monitoring	VII.G-30 (A-92)	3.3.1-66	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-31 (A-93)	3.3.1-67	A
			Air-Indoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 III.A5-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 III.A5-10 (T-06)	3.5.1-24	A

TABLE 3.5.2-2 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Above Grade (continued)	C-2 C-3 C-4 C-6 C-7 C-8 C-14	Reinforced Concrete	Air-Indoor	Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.1-1 III.B1.2-1 III.B2-1 III.B3-1 III.B4-1 III.B5-1 (T-29)	3.5.1-40	A
				Cracking Loss of Material	Fire Protection and Structures Monitoring	VII.G-28 (A-90)	3.3.1-65	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-29 (A-91)	3.3.1-67	A
Concrete: Below Grade	C-2 C-3 C-7 C-8	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-3 III.A5-3 (T-08)	3.5.1-28	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 III.A5-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 III.A5-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 III.A5-7 (T-02)	3.5.1-32	A

TABLE 3.5.2-2 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Foundation	C-2 C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-3 III.A5-3 (T-08)	3.5.1-28	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 III.A5-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 III.A5-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 III.A5-7 (T-02)	3.5.1-32	A
Concrete: Submerged	C-2 C-7	Reinforced Concrete	Raw Water - Seawater	Loss of Material Cracking Change in Material Properties	Structures Monitoring			G, 543
				Change in Material Properties	Structures Monitoring	III.A3-7 III.A5-7 (T-02)	3.5.1-32	A
				Loss of material	Structures Monitoring	III.A6-7 (T-20)	3.5.1-45	A, 520

TABLE 3.5.2-2 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Cranes	C-7	Carbon Steel	Air - Indoor	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A, 535
				Loss of Material / Wear (of Rail)	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A, 535
				None	None	VII.B-2 (A-06)	3.3.1-01	I
Damper Mountings	C-2 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B4-10 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B4-5 (TP-11)	3.5.1-58	A
Door (Non-fire)	C-3 C-8	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
Door	C-3 C-4	Carbon Steel	Air - Indoor	Loss of Material	Fire Protection and Structures Monitoring	VII.G-3 (A-21)	3.3.1-63	E
			Air - Outdoor	Loss of Material	Fire Protection and Structures Monitoring	VII.G-4 (A-22)	3.3.1-63	E
Draft Stop	C-7	Galvanized Carbon Steel	Air - Indoor	None	None	III.B5-3 (TP-11)	3.5.1-58	C, 519, 522

TABLE 3.5.2-2 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Expansion Bellows	C-15	Stainless Steel	Treated Water	Loss of Material Cracking	Water Chemistry	III.A5-13 (T-14)	3.5.1-46	C, 505
				Fatigue Damage	TLAA	II.A3-4 (C-13)	3.5.1-09	C, 542
Fire Barrier Assemblies	C-4	Fire Proofing Materials	Air - Indoor	Loss of Material Cracking / Delamination Separation	Fire Protection			J, 526
Fire Barrier Penetration Seals	C-4	Fire Proofing Materials	Air - Indoor	Loss of Material Cracking / Delamination Separation Change in Material Properties	Fire Protection	VII.G-1 (A-19)	3.3.1-61	A
			Air - Outdoor	Loss of Material Cracking / Delamination Separation Change in Material Properties	Fire Protection	VII.G-2 (A-19)	3.3.1-61	A
Fire Hose Stations	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-8 (TP-25)	3.5.1-55	C, 522

TABLE 3.5.2-2 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Floor Drains	C-8	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-8 (TP-25)	3.5.1-55	C, 522
		Stainless Steel	Air - Indoor	None	None	III.B5-5 (TP-5)	3.5.1-59	C, 522
			Borated Water Leakage	None	None	III.B5-6 (TP-4)	3.5.1-59	C, 522
Masonry Walls	C-8	Concrete Block	Air - Indoor	Cracking	Masonry Wall	III.A3-11 III.A5-11 (T-12)	3.5.1-43	A
New Fuel Storage Racks	C-2	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	VII.A1-1 (A-94)	3.3.1-86	A
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures	C-2 C-7 C-8 C-11	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-8 (TP-25)	3.5.1-55	A
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B5-3 (TP-11)	3.5.1-58	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-4 (A-94)	3.5.1-55	A

TABLE 3.5.2-2 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (continued)	C-2 C-7 C-8 C-11	Stainless Steel	Air - Indoor	None	None	III.B5-5 (TP-5)	3.5.1-59	A
			Borated Water Leakage	None	None	III.B5-6 (TP-4)	3.5.1-59	A
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-2 C-3 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B3-8 (T-25)	3.5.1-55	A
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B3-3 (TP-11)	3.5.1-58	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B3-4 (TP-3)	3.5.1-55	A
		Aluminum	Air - Indoor	None	None	III.B3-2 (TP-8)	3.5.1-58	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B3-4 (TP-3)	3.5.1-55	A
		Stainless Steel	Air - Indoor	None	None	III.B3-5 (TP-5)	3.5.1-59	A
			Borated Water Leakage	None	None	III.B3-6 (TP-4)	3.5.1-59	A

TABLE 3.5.2-2 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Roof-Membrane / Built-up	C-3	Elastomer	Air - Outdoor	Cracking Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 529
Seals and Gaskets	C-2 C-3 C-7 C-8	Elastomer	Air - Indoor	Cracking Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 509
			Air - Outdoor	Cracking Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 509, 536
Siding	C-3 C-7	Aluminum	Air - Indoor	None	None	III.B5-2 (TP-8)	3.5.1-58	C, 522
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B4-7 (TP-6)	3.5.1-50	C, 532
Spent Fuel Storage Racks	C-2 C-10	Stainless Steel	Treated Water	Cracking	Water Chemistry	VII.A2-7 (A-97)	3.3.1-90	A
		Boral	Treated Water	None	None	VII.A2-3 (A-89) VII.A2-5 (A-88)	3.3.1-13	I, 528
		Carborundum (B_4C)	Treated Water	Loss of Material	Carborundum (B_4C)			F, 540
Steel Components: All Structural Steel	C-2 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.A3-12 (T-11)	3.5.1-25	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-8 (TP-25)	3.5.1-55	C, 522

TABLE 3.5.2-2 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steel Components: Fuel Pool Liner	C-2 C-7	Stainless Steel	Treated Water	Loss of Material Cracking	Water Chemistry , Monitoring of spent fuel pool level, and Monitoring Leakage from the Leak Chase Channels	III.A5-13 (T-14)	3.5.1-46	A
			Air - Indoor	None	None	III.B5-5 (TP-5)	3.5.1-59	C, 522
			Borated Water Leakage	None	None	III.B5-6 (TP-4)	3.5.1-59	C, 522
Supports for ASME Class 1, 2, 3 Piping & Components	C-2	Carbon Steel	Air - Indoor	Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.1-2 III.B1.2-2 (T-28)	3.5.1-54	A
				Loss of Material	ASME Section XI, Subsection IWF	III.B1.1-13 III.B1.2-10 (T-24)	3.5.1-53	A
			Air - Outdoor	Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.1-2 III.B1.2-2 (T-28)	3.5.1-54	A
				Loss of Material	ASME Section XI, Subsection IWF	III.B1.1-13 III.B1.2-10 (T-24)	3.5.1-53	A

TABLE 3.5.2-2 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Supports for ASME Class 1, 2, 3 Piping & Components (continued)	C-2	Carbon Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B1.1-14 III.B1.2-11 (T-25)	3.5.1-55	A
		Fluorogold	Air - Indoor	Loss of Mechanical Function	ASME Section XI, Subsection IWF			J, 549
Supports for EDG, HVAC System Components, and Other Miscellaneous Mechanical Equipment	C-2 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B4-10 (T-30)	3.5.1-39	A, 518
Supports for Non-ASME Piping & Components	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B2-11 (T-25)	3.5.1-55	A

TABLE 3.5.2-3 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – WAVE EMBANKMENT PROTECTION STRUCTURE

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Above Grade	C-7	Reinforced Concrete (Includes Unreinforced Concrete, and Fabriform)	Air - Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A, 524, 550
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A, 550
Concrete: Below Grade	C-7	Reinforced Concrete (Includes Unreinforced Concrete and Fabriform)	Soil	Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A, 550
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A, 524, 550
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A, 550
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A, 550

TABLE 3.5.2-3 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – WAVE EMBANKMENT PROTECTION STRUCTURE

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Foundation	C-7	Reinforced Concrete (Includes Unreinforced Concrete)	Soil	Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A, 550
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A, 524, 550
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A, 550
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A, 550
Earthen Berm	C-7 C-8	Earth	Air - Outdoor	Loss of Material	Structures Monitoring	III.A6-9	3.5.1-48	E, 531
				Loss of Form	Structures Monitoring	III.A6-9	3.5.1-48	E, 531

TABLE 3.5.2-4 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – BORATED WATER STORAGE TANK FOUNDATION AND SHIELD WALL

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-2 C-7	Carbon Steel	Reinforced Concrete	None	None			J, 501
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-2 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B2-11 (T-25)	3.5.1-55	A
		Galvanized Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B2-6 (TP-3)	3.5.1-55	A
		Aluminum	Air - Indoor	None	None	III.B2-4 (TP-8)	3.5.1-58	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B2-6 (TP-3)	3.5.1-55	A
Concrete: Above Grade	C-2 C-3 C-6 C-7 C-8	Reinforced Concrete	Air - Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A, 544
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A, 544

TABLE 3.5.2-4 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – BORATED WATER STORAGE TANK FOUNDATION AND SHIELD WALL

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Above Grade (continued)	C-2 C-3 C-6 C-7 C-8	Reinforced Concrete	Air - Outdoor	Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B2-1 III.B3-1 III.B5-1 (T-29)	3.5.1-40	A
			Air - Indoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B2-1 III.B3-1 III.B5-1 (T-29)	3.5.1-40	A
Door (Non-fire)	C-3 C-8	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522

TABLE 3.5.2-4 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – BORATED WATER STORAGE TANK FOUNDATION AND SHIELD WALL

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-8 (TP-25)	3.5.1-55	A
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-2 C-3 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B3-8 (T-25)	3.5.1-55	A
		Aluminum	Air - Indoor	None	None	III.B3-2 (TP-8)	3.5.1-58	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B3-4 (TP-3)	3.5.1-55	A
Seals and Gaskets	C-3 C-7 C-8	Elastomer	Air - Outdoor	Cracking Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 521

TABLE 3.5.2-4 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – BORATED WATER STORAGE TANK FOUNDATION AND SHIELD WALL

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Supports for EDG, HVAC System Components, and Other Miscellaneous Mechanical Equipment	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B4-10 (T-30)	3.5.1-39	A
Supports for Non-ASME Piping & Components	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B2-11 (T-25)	3.5.1-55	A

TABLE 3.5.2-5 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CABLE BRIDGE

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-7	Carbon Steel	Reinforced Concrete	None	None			J, 501
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B2-5 (TP-11)	3.5.1-58	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A
		Aluminum	Air - Indoor	None	None	III.B2-4 (TP-8)	3.5.1-58	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A
		Stainless Steel	Air - Indoor	None	None	III.B2-8 (TP-5)	3.5.1-59	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A
Concrete: Above Grade	C-7	Reinforced Concrete	Air - Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A

TABLE 3.5.2-5 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CABLE BRIDGE

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Above Grade	C-7	Reinforced Concrete	Air - Outdoor	Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B2-1 III.B3-1 (T-29)	3.5.1-40	A
			Air - Indoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B2-1 III.B5-1 (T-29)	3.5.1-40	A
Concrete: Below Grade	C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A

TABLE 3.5.2-5 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CABLE BRIDGE

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Foundation	C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
Concrete: Submerged	C-7	Reinforced Concrete	Raw Water - Seawater	Loss of Material Cracking Change in Material Properties	Structures Monitoring			G, 543
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
				Loss of Material	Structures Monitoring	III.A6-7 (T-20)	3.5.1-45	A, 520
Door (Non-fire)	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522

TABLE 3.5.2-5 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CABLE BRIDGE

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures	C-7	Stainless Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B4-7 (TP-6)	3.5.1-50	C, 532
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B3-3 (TP-11)	3.5.1-58	A
Steel Components: All Structural Steel	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.A3-12 (T-11)	3.5.1-25	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.A3-12 (T-11)	3.5.1-25	A
		Stainless Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B4-7 (TP-6)	3.5.1-50	C, 532
		Fluorogold	Air - Outdoor	Lock-up	Structures Monitoring			J, 551

TABLE 3.5.2-6 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL COMPLEX

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-2 C-7	Carbon Steel	Reinforced Concrete	None	None			J, 501
Battery Racks	C-2 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-2 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B2-5 (TP-11)	3.5.1-58	A
		Aluminum	Air - Indoor	None	None	III.B2-4 (TP-8)	3.5.1-58	A
		Stainless Steel	Air - Indoor	None	None	III.B2-8 (TP-5)	3.5.1-59	A
		Copper	Air - Indoor	None	None			J, 525
Concrete: Above Grade	C-1 C-2 C-3 C-4 C-6 C-7 C-8	Reinforced Concrete	Air - Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A1-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A1-10 (T-06)	3.5.1-24	A
				Cracking Loss of Material	Fire Protection and Structures Monitoring	VII.G-30 (A-92)	3.3.1-66	A, 539

TABLE 3.5.2-6 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL COMPLEX

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Above Grade (continued)	C-1 C-2 C-3 C-4 C-6 C-7 C-8	Reinforced Concrete	Air - Outdoor	Loss of Material	Fire Protection and Structures Monitoring	VII.G-31 (A-93)	3.3.1-67	A, 539
			Air - Indoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A1-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A1-10 (T-06)	3.5.1-24	A
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1 III.B2-1 III.B3-1 III.B4-1 III.B5-1 (T-29)	3.5.1-40	A
				Cracking Loss of Material	Fire Protection and Structures Monitoring	VII.G-28 (A-90)	3.3.1-65	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-29 (A-91)	3.3.1-67	A

TABLE 3.5.2-6 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL COMPLEX

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Below Grade	C-1 C-2 C-3 C-7 C-8	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A1-3 (T-08)	3.5.1-28	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A1-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A1-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A1-7 (T-02)	3.5.1-32	A
Concrete: Foundation	C-2 C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A1-3 (T-08)	3.5.1-28	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A1-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A1-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A1-7 (T-02)	3.5.1-32	A
Control Room Ceiling	C-7	Willtec Foam	Air - Indoor	None	None			J, 530

TABLE 3.5.2-6 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL COMPLEX

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Damper Mountings	C-2 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B4-10 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B4-5 (TP-11)	3.5.1-58	A
Door	C-1 C-3 C-4	Carbon Steel	Air - Indoor	Loss of Material	Fire Protection and Structures Monitoring	VII.G-3 (A-21) VII.G-4 (A-22)	3.3.1-63	E
Fire Barrier Assemblies	C-4	Fire Proofing Materials	Air - Indoor	Loss of Material Cracking / Delamination Separation	Fire Protection			J, 526
Fire Barrier Penetration Seals	C-4	Fire Proofing Materials	Air - Indoor	Loss of Material Cracking / Delamination Separation Change in Material Properties	Fire Protection	VII.G-1 (A-19)	3.3.1-61	A
Fire Hose Stations	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
Floor Drains	C-8	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
		Stainless Steel	Air - Indoor	None	None	III.B5-5 (TP-5)	3.5.1-59	C, 522
Masonry Walls	C-7	Concrete Block	Air - Indoor	Cracking	Masonry Wall	III.A3-11 (T-12)	3.5.1-43	A

TABLE 3.5.2-6 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL COMPLEX

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Phase Bus Duct Enclosure Assemblies	C-3 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	VI.A-13 (LP-06)	3.6.1-09	A
		Aluminum	Air - Indoor	None	None	III.B3-2 (TP-8)	3.5.1-58	A
		Stainless Steel	Air - Indoor	None	None	III.B3-5 (TP-5)	3.5.1-59	A
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-2 C-3 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B3-3 (TP-11)	3.5.1-58	A
		Aluminum	Air - Indoor	None	None	III.B3-2 (TP-8)	3.5.1-58	A
		Stainless Steel	Air - Indoor	None	None	III.B3-5 (TP-5)	3.5.1-59	A
Raised Floor	C-2 C-4	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
Roof-Membrane / Built-up	C-3	Elastomer	Air - Outdoor	Cracking Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 529
Steel Components: All Structural Steel	C-2 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.A1-12 (T-11)	3.5.1-25	A

TABLE 3.5.2-6 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL COMPLEX

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Supports for ASME Class 1, 2, 3 Piping & Components	C-2	Carbon Steel	Air - Indoor	Loss of Material	ASME Section XI, Subsection IWF	III.B1.2-10 (T-24)	3.5.1-53	A
				Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.2-2 (T-28)	3.5.1-54	A
Supports for EDG, HVAC System Components, and Other Miscellaneous Mechanical Equipment	C-2 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B4-10 (T-30)	3.5.1-39	A, 518
		Elastomer	Air - Indoor	Reduction or Loss of Isolation Function	Structures Monitoring	III.B4-12 (T-31)	3.5.1-41	A, 538
Supports for Non-ASME Piping & Components	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A

TABLE 3.5.2-7 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – INTAKE AND DISCHARGE CANALS

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Earthen Water-Control Structures: Dams, embankments, reservoirs, channels, canals and ponds	C-5 C-7	Earth	Air-Outdoor	Loss of Material Loss of Form	Structures Monitoring	III.A6-9 (T-22)	3.5.1-48	E, 531
			Raw Water - Seawater	Loss of Material Loss of Form	Structures Monitoring	III.A6-9 (T-22)	3.5.1-48	E, 531

TABLE 3.5.2-8 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CIRCULATING WATER DISCHARGE STRUCTURE

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Above Grade	C-7	Reinforced Concrete	Air - Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A6-1 (T-18)	3.5.1-34	A, 531
Concrete: Below Grade	C-7	Reinforced Concrete	Soil	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A6-1 (T-18)	3.5.1-34	A, 531
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A6-3 (T-19)	3.5.1-34	A, 531
				Cracking	Structures Monitoring	III.A6-4 (T-08)	3.5.1-28	A
				Change in Material Properties	Structures Monitoring	III.A6-6 (T-16)	3.5.1-37	A, 531
Concrete: Foundation	C-7	Reinforced Concrete	Soil	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A6-1 (T-18)	3.5.1-34	A, 531
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A6-3 (T-19)	3.5.1-34	A, 531

TABLE 3.5.2-8 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CIRCULATING WATER DISCHARGE STRUCTURE

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Foundation (continued)	C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A6-4 (T-08)	3.5.1-28	A
				Change in Material Properties	Structures Monitoring	III.A6-6 (T-16)	3.5.1-37	A, 531
Concrete: Submerged	C-7	Reinforced Concrete	Raw Water - Seawater	Loss of Material Cracking Change in Material Properties	Structures Monitoring			G, 543
				Change in Material Properties	Structures Monitoring	III.A6-6 (T-16)	3.5.1-37	A, 531
				Loss of Material	Structures Monitoring	III.A6-7 (T-20)	3.5.1-45	A, 531

TABLE 3.5.2-9 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CIRCULATING WATER INTAKE STRUCTURE

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-7	Carbon Steel	Reinforced Concrete	None	None			J, 501
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-7	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A
		Stainless Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A
Concrete: Above Grade	C-2 C-5 C-7	Reinforced Concrete	Air - Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A6-1 (T-18)	3.5.1-34	A, 531
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B2-1 III.B3-1 III.B5-1 (T-29)	3.5.1-40	A
Concrete: Below Grade	C-2 C-5 C-7	Reinforced Concrete	Soil	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A6-3 (T-19)	3.5.1-34	A, 531
				Cracking	Structures Monitoring	III.A6-4 (T-08)	3.5.1-28	A
				Change in Material Properties	Structures Monitoring	III.A6-6 (T-16)	3.5.1-37	A, 531

TABLE 3.5.2-9 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CIRCULATING WATER INTAKE STRUCTURE

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Foundation	C-2 C-5 C-7	Reinforced Concrete	Soil	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A6-3 (T-19)	3.5.1-34	A, 531
				Cracking	Structures Monitoring	III.A6-4 (T-08)	3.5.1-28	A
				Change in Material Properties	Structures Monitoring	III.A6-6 (T-16)	3.5.1-37	A, 531
Concrete: Submerged	C-2 C-5 C-7	Reinforced Concrete	Raw Water - Seawater	Loss of Material Cracking Change in Material Properties	Structures Monitoring			G, 543
				Change in Material Properties	Structures Monitoring	III.A6-6 (T-16)	3.5.1-37	A, 531
				Loss of Material	Structures Monitoring	III.A6-7 (T-20)	3.5.1-45	A, 531
Cranes	C-7	Carbon Steel	Air - Outdoor	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A, 535
				Loss of Material / Wear (of Rail)	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A, 535
				None	None	VII.B-2 (A-06)	3.3.1-01	I

TABLE 3.5.2-9 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CIRCULATING WATER INTAKE STRUCTURE

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures	C-7	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	A
			Raw Water - Seawater	Loss of Material	Structures Monitoring	III.A6-11 (T-21)	3.5.1-47	A, 531
		Stainless Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B4-7 (TP-6)	3.5.1-50	C, 532
			Raw Water - Seawater	Loss of Material	Structures Monitoring			J, 537
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-7	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B4-7 (TP-6)	3.5.1-50	C, 532
		Stainless Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B4-7 (TP-6)	3.5.1-50	C, 532
Supports for Non-ASME Piping & Components	C-7	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A

TABLE 3.5.2-10 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-2 C-7	Carbon Steel	Reinforced Concrete	None	None			J, 501
Battery Racks	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-2 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B2-5 (TP-11)	3.5.1-58	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A
		Aluminum	Air - Indoor	None	None	III.B2-4 (TP-8)	3.5.1-58	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A
		Stainless Steel	Air - Indoor	None	None	III.B2-8 (TP-5)	3.5.1-59	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A

TABLE 3.5.2-10 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Above Grade	C-2 C-3 C-4 C-6 C-7 C-8 C-13	Reinforced Concrete	Air - Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1 III.B2-1 III.B5-1 (T-29)	3.5.1-40	A
				Cracking Loss of Material	Fire Protection and Structures Monitoring	VII.G-30 (A-92)	3.3.1-66	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-31 (A-93)	3.3.1-67	A
			Air - Indoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A

TABLE 3.5.2-10 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Above Grade (continued)	C-2 C-3 C-4 C-6 C-7 C-8 C-13	Reinforced Concrete	Air - Indoor	Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1 III.B2-1 III.B3-1 III.B4-1 III.B5-1 (T-29)	3.5.1-40	A
				Cracking Loss of Material	Fire Protection and Structures Monitoring	VII.G-28 (A-90)	3.3.1-65	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-29 (A-91)	3.3.1-67	A
Concrete: Below Grade	C-2 C-3 C-7 C-8	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A

TABLE 3.5.2-10 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Foundation	C-2 C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
Damper Mountings	C-2 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B4-10 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B4-5 (TP-11)	3.5.1-58	A
Door	C-3 C-4	Carbon Steel	Air - Indoor	Loss of Material	Fire Protection and Structures Monitoring	VII.G-3 (A-21) VII.G-4 (A-22)	3.3.1-63	E

TABLE 3.5.2-10 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fire Barrier Penetration Seals	C-4	Fire Proofing Materials	Air - Indoor	Loss of Material Cracking / Delamination Separation Change in Material Properties	Fire Protection	VII.G-1 (A-19)	3.3.1-61	A
			Air - Outdoor	Loss of Material Cracking / Delamination Separation Change in Material Properties	Fire Protection	VII.G-2 (A-20)	3.3.1-61	A
Floor Drains	C-8	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
		Stainless Steel	Air - Indoor	None	None	III.B5-5 (TP-5)	3.5.1-59	C, 522
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures	C-2 C-7 C-8	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B4-7 (TP-6)	3.5.1-50	C, 532, 541

TABLE 3.5.2-10 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-2 C-3 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
		Aluminum	Air - Indoor	None	None	III.B3-2 (TP-8)	3.5.1-58	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B4-7 (TP-6)	3.5.1-50	C, 532
Roof-Membrane / Built-up	C-3	Elastomer	Air - Outdoor	Cracking Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 529
Seals and Gaskets	C-8	Elastomer	Air - Indoor	Cracking Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 509
			Air - Outdoor	Cracking Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 509
Steel Components: All Structural Steel	C-2 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.A3-12 (T-11)	3.5.1-25	A
Supports for ASME Class 1, 2, 3 Piping & Components	C-2	Carbon Steel	Air - Indoor	Loss of Material	ASME Section XI, Subsection IWF	III.B1.2-10 (T-24)	3.5.1-53	A
				Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.2-2 (T-28)	3.5.1-54	A
			Air - Outdoor	Loss of Material	ASME Section XI, Subsection IWF	III.B1.2-10 (T-24)	3.5.1-53	A
				Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.2-2 (T-28)	3.5.1-54	A

TABLE 3.5.2-10 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Supports for EDG, HVAC System Components, and Other Miscellaneous Mechanical Equipment	C-2 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B4-10 (T-30)	3.5.1-39	A, 518
Supports for Non-ASME Piping & Components	C-2 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Air - Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A

TABLE 3.5.2-11 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – EFW PUMP BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-2 C-7	Carbon Steel	Reinforced Concrete	None	None			J, 501
		Stainless Steel	Reinforced Concrete	None	None			J, 501
Battery Racks	C-2 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-2 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B2-5 (TP-11)	3.5.1-58	A
		Aluminum	Air - Indoor	None	None	III.B2-4 (TP-8)	3.5.1-58	A
Concrete: Above Grade	C-2 C-3 C-4 C-6 C-7 C-8	Reinforced Concrete	Air - Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B2-1 (T-29)	3.5.1-40	A
				Cracking Loss of Material	Fire Protection and Structures Monitoring	VII.G-30 (A-92)	3.3.1-66	A

TABLE 3.5.2-11 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – EFW PUMP BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Above Grade (continued)	C-2 C-3 C-4 C-6 C-7 C-8	Reinforced Concrete	Air - Outdoor	Loss of Material	Fire Protection and Structures Monitoring	VII.G-31 (A-93)	3.3.1-67	A
			Air - Indoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1 III.B2-1 III.B3-1 III.B5-1 (T-29)	3.5.1-40	A
				Cracking Loss of Material	Fire Protection and Structures Monitoring	VII.G-28 (A-90)	3.3.1-65	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-29 (A-91)	3.3.1-67	A

TABLE 3.5.2-11 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – EFW PUMP BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Below Grade	C-2 C-3 C-7 C-8	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
Concrete: Foundation	C-2 C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A

TABLE 3.5.2-11 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – EFW PUMP BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Cranes	C-7	Carbon Steel	Air - Indoor	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A, 535
				Loss of Material / Wear (of Rail)	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A, 535
				None	None	VII.B-2 (A-06)	3.3.1-01	I
Damper Mountings	C-2	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B4-10 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B4-5 (TP-11)	3.5.1-58	A
Door (Non-fire)	C-3 C-8	Stainless Steel	Air - Indoor	None	None	III.B5-5 (TP-5)	3.5.1-59	C, 522
Door	C-4	Carbon Steel	Air - Indoor	Loss of Material	Fire Protection and Structures Monitoring	VII.G-3 (A-21) VII.G-4 (A-22)	3.3.1-63	E
Fire Barrier Assemblies	C-4	Fire Proofing Materials	Air - Indoor	Loss of Material Cracking / Delamination Separation	Fire Protection			J, 526
Floor Drains	C-8	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522

TABLE 3.5.2-11 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – EFW PUMP BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures	C-2 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B5-3 (TP-11)	3.5.1-58	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B4-7 (TP-6)	3.5.1-50	C, 532
		Stainless Steel	Air - Indoor	None	None	III.B5-5 (TP-5)	3.5.1-59	A
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-2 C-3 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
		Aluminum	Air - Indoor	None	None	III.B3-2 (TP-8)	3.5.1-58	A
Seals and Gaskets	C-3 C-8	Elastomer	Air - Indoor	Cracking Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 509
Steel Components: All Structural Steel	C-2 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.A3-12 (T-11)	3.5.1-25	A
Supports for ASME Class 1, 2, 3 Piping & Components	C-2	Carbon Steel	Air - Indoor	Loss of Material	ASME Section XI, Subsection IWF	III.B1.2-10 (T-24)	3.5.1-53	A
				Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.2-2 (T-28)	3.5.1-54	A
		Stainless Steel	Air - Indoor	None	None	III.B1.2-7 (TP-5)	3.5.1-59	A

TABLE 3.5.2-11 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – EFW PUMP BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Supports for Non-ASME Piping & Components	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Stainless Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A

TABLE 3.5.2-12 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DEDICATED EFW TANK ENCLOSURE BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-2 C-7	Carbon Steel	Reinforced Concrete	None	None			J, 501
		Stainless Steel	Reinforced Concrete	None	None			J, 501
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-2 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B2-5 (TP-11)	3.5.1-58	A
		Aluminum	Air - Indoor	None	None	III.B2-4 (TP-8)	3.5.1-58	A
		Stainless Steel	Air - Indoor	None	None	III.B2-8 (TP-5)	3.5.1-59	A
			Treated Water	Loss of Material	Structures Monitoring			G, 527
Concrete: Above Grade	C-2 C-3 C-6 C-7 C-8	Reinforced Concrete	Air - Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A, 544
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A, 544
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1 III.B2-1 III.B3-1 (T-29)	3.5.1-40	A

TABLE 3.5.2-12 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DEDICATED EFW TANK ENCLOSURE BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Above Grade (continued)	C-2 C-3 C-6 C-7 C-8	Reinforced Concrete	Air - Indoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A, 544
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A, 544
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1 III.B2-1 III.B3-1 (T-29)	3.5.1-40	A
			Treated Water	Loss of Material Cracking Change in Material Properties	Structures Monitoring			G, 545
Concrete: Below Grade	C-2 C-3 C-7 C-8	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A8-2 (T-08)	3.5.1-28	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A8-3 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A8-4 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A8-6 (T-02)	3.5.1-32	A

TABLE 3.5.2-12 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DEDICATED EFW TANK ENCLOSURE BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Foundation	C-2 C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A8-2 (T-08)	3.5.1-28	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A8-3 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A8-4 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A8-6 (T-02)	3.5.1-32	A
Damper Mountings	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B4-10 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B4-5 (TP-11)	3.5.1-58	A
Door (Non-fire)	C-3 C-8	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
Floor Drains	C-8	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-2 C-3 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B3-3 (TP-11)	3.5.1-58	A

TABLE 3.5.2-12 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DEDICATED EFW TANK ENCLOSURE BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Seals and Gaskets	C-3 C-8	Elastomer	Air - Indoor	Cracking Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 509
Steel Components: All Structural Steel	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.A3-12 (T-11)	3.5.1-25	A
Supports for ASME Class 1, 2, 3 Piping & Components	C-2	Carbon Steel	Air - Indoor	Loss of Material	ASME Section XI, Subsection IWF	III.B1.2-10 (T-24)	3.5.1-53	A
				Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.2-2 (T-28)	3.5.1-54	A
			Treated Water	Loss of Material	ASME Section XI, Subsection IWF			G, 546
				Loss of Mechanical Function	ASME Section XI, Subsection IWF			G, 547
		Stainless Steel	Air - Indoor	None	None	III.B1.2-7 (T-59)	3.5.1-59	A
			Treated Water	Loss of Material	ASME Section XI, Subsection IWF			G, 527
Supports for Non-ASME Piping & Components	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Treated Water	Loss of Material	Structures Monitoring			G, 546

TABLE 3.5.2-13 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE SERVICE PUMPHOUSE

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-7	Carbon Steel	Reinforced Concrete	None	None			J, 501
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B2-5 (TP-11)	3.5.1-58	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A
		Aluminum	Air - Indoor	None	None	III.B2-4 (TP-8)	3.5.1-58	A
		Stainless Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A
Concrete: Above Grade	C-7	Reinforced Concrete	Air - Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B2-1 III.B3-1 (T-29)	3.5.1-40	A

TABLE 3.5.2-13 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE SERVICE PUMPHOUSE

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Above Grade (continued)	C-7	Reinforced Concrete	Air - Indoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B2-1 III.B3-1 (T-29)	3.5.1-40	A
Concrete: Foundation	C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
Damper Mountings	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B4-10 (T-30)	3.5.1-39	A

TABLE 3.5.2-13 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE SERVICE PUMPHOUSE

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Door (Non-fire)	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
Masonry Walls	C-7	Concrete Block	Air - Indoor	Cracking	Masonry Wall	III.A3-11 (T-12)	3.5.1-43	A
			Air - Outdoor	Cracking	Masonry Wall	III.A3-11 (T-12)	3.5.1-43	A
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	A, 541
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
		Aluminum	Air - Indoor	None	None	III.B3-2 (TP-8)	3.5.1-58	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B4-7 (TP-6)	3.5.1-50	C, 532

TABLE 3.5.2-13 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE SERVICE PUMPHOUSE

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Roof-Membrane / Built-Up	C-7	Elastomer	Air - Outdoor	Cracking Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 529
Steel Components: All Structural Steel	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.A3-12 (T-11)	3.5.1-25	A
Supports for EDG, HVAC System Components, and Other Miscellaneous Mechanical Equipment	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B4-10 (T-30)	3.5.1-39	A, 518
Supports for Non-ASME Piping & Components	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A

TABLE 3.5.2-14 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – INTERMEDIATE BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-2 C-7	Carbon Steel	Reinforced Concrete	None	None			J, 501
	C-7	PVC	Reinforced Concrete	None	None			J, 501
Battery Racks	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-2 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B2-11 (T-25)	3.5.1-55	A, 533
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B2-5 (TP-11)	3.5.1-58	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B2-6 (TP-3)	3.5.1-55	A, 533
		Aluminum	Air - Indoor	None	None	III.B2-4 (TP-8)	3.5.1-58	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B2-6 (TP-3)	3.5.1-55	A, 533
		Stainless Steel	Air - Indoor	None	None	III.B2-8 (TP-5)	3.5.1-59	A
			Borated Water Leakage	None	None	III.B2-9 (TP-4)	3.5.1-59	A

TABLE 3.5.2-14 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – INTERMEDIATE BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Above Grade	C-2 C-3 C-4 C-6 C-7 C-8	Reinforced Concrete	Air - Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B2-1 (T-29)	3.5.1-40	A
				Cracking Loss of Material	Fire Protection and Structures Monitoring	VII.G-30 (A-92)	3.3.1-66	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-31 (A-93)	3.3.1-67	A

TABLE 3.5.2-14 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – INTERMEDIATE BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Above Grade (continued)	C-2 C-3 C-4 C-6 C-7 C-8	Reinforced Concrete	Air - Indoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.1-1 III.B1.2-1 III.B2-1 III.B3-1 III.B4-1 III.B5-1 (T-29)	3.5.1-40	A
				Cracking Loss of Material	Fire Protection and Structures Monitoring	VII.G-28 (A-90)	3.3.1-65	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-29 (A-91)	3.3.1-67	A

TABLE 3.5.2-14 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – INTERMEDIATE BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Below Grade	C-2 C-3 C-7 C-8	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
Concrete: Foundation	C-2 C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A

TABLE 3.5.2-14 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – INTERMEDIATE BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Damper Mountings	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B4-10 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B4-5 (TP-11)	3.5.1-58	A
Door (Non-fire)	C-7	Stainless Steel	Air - Indoor	None	None	III.B5-5 (TP-5)	3.5.1-59	C, 522
Door	C-3 C-4	Carbon Steel	Air - Indoor	Loss of Material	Fire Protection and Structures Monitoring	VII.G-3 (A-21) VII.G-4 (A-22)	3.3.1-63	E
Fire Barrier Assemblies	C-4	Fire Proofing Materials	Air - Indoor	Loss of Material Cracking / Delamination Separation	Fire Protection			J, 526
Fire Barrier Penetration Seals	C-4	Fire Proofing Materials	Air - Indoor	Loss of Material Cracking / Delamination Separation Change in Material Properties	Fire Protection	VII.G-1 (A-19)	3.3.1-61	A
			Air - Outdoor	Loss of Material Cracking / Delamination Separation Change in Material Properties	Fire Protection	VII.G-2 (A-20)	3.3.1-61	A
Fire Hose Stations	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522

TABLE 3.5.2-14 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – INTERMEDIATE BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Floor Drains	C-8	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-8 (TP-25)	3.5.1-55	C, 522, 533
Phase Bus Duct Enclosure Assemblies	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	VI.A-13 (T-30)	3.6.1-09	A
		Aluminum	Air - Indoor	None	None	III.B3-2 (LP-06)	3.5.1-58	A
		Stainless Steel	Air - Indoor	None	None	III.B3-5 (TP-5)	3.5.1-59	A
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures	C-2 C-7 C-11	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	A, 541
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-8 (TP-25)	3.5.1-55	A, 533
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B5-3 (TP-11)	3.5.1-58	A
		Stainless Steel	Air - Indoor	None	None	III.B5-5 (TP-5)	3.5.1-59	A
			Borated Water Leakage	None	None	III.B5-6 (TP-4)	3.5.1-59	A, 533

TABLE 3.5.2-14 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – INTERMEDIATE BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-2 C-3 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B3-8 (T-25)	3.5.1-55	A, 533
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B3-3 (TP-11)	3.5.1-58	A
		Aluminum	Air - Indoor	None	None	III.B3-2 (TP-8)	3.5.1-58	A
		Stainless Steel	Air - Indoor	None	None	III.B3-5 (TP-5)	3.5.1-59	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B4-7 (TP-6)	3.5.1-50	C, 532
Roof-Membrane / Built-Up	C-3	Elastomer	Air - Outdoor	Cracking Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 529
Seals and Gaskets	C-2 C-3 C-7 C-8	Elastomer	Air - Indoor	Cracking Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 509
Steel Components: All Structural Steel	C-2 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.A3-12 (T-11)	3.5.1-25	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-8 (TP-25)	3.5.1-55	C, 522, 533

TABLE 3.5.2-14 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – INTERMEDIATE BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Supports for ASME Class 1, 2, 3 Piping & Components	C-2	Carbon Steel	Air - Indoor	Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.1-2 III.B1.2-2 (T-28)	3.5.1-54	A
				Loss of Material	ASME Section XI, Subsection IWF	III.B1.1-13 III.B1.2-10 (T-24)	3.5.1-53	A
		Fluorogold	Air - Indoor	Loss of Mechanical Function	ASME Section XI, Subsection IWF			F, 549
Supports for EDG, HVAC System Components, and Other Miscellaneous Mechanical Equipment	C-2 C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B4-10 (T-30)	3.5.1-39	A, 518
		Elastomer	Air - Indoor	Reduction or Loss of Isolation Function	Structures Monitoring	III.B4-12 (T-31)	3.5.1-41	A, 538
Supports for Non-ASME Piping & Components	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B2-11 (T-25)	3.5.1-55	A, 533

TABLE 3.5.2-15 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – MACHINE SHOP

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-7	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Aluminum	Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A
Door	C-4	Carbon Steel	Air - Indoor	Loss of Material	Fire Protection and Structures Monitoring	VII.G-3 (A-21) VII.G-4 (A-22)	3.3.1-63	E
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-7	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
Supports for EDG, HVAC System Components, and Other Miscellaneous Mechanical Equipment	C-7	Elastomer	Air - Outdoor	Reduction or Loss of Isolation Function	Structures Monitoring	III.B4-12 (T-31)	3.5.1-41	A, 538
Supports for Non-ASME Piping & Components	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A

TABLE 3.5.2-16 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – MISCELLANEOUS STRUCTURES

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-2 C-6 C-7 C-8	Carbon Steel	Reinforced Concrete	None	None			J, 501
		Stainless Steel	Reinforced Concrete	None	None			J, 501
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A
		Aluminum	Air - Indoor	None	None	III.B2-4 (TP-8)	3.5.1-58	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A
		Stainless Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A
Concrete: Above Grade	C-2 C-6 C-7 C-8	Reinforced Concrete	Air - Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A

TABLE 3.5.2-16 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – MISCELLANEOUS STRUCTURES

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Above Grade (continued)	C-2 C-6 C-7 C-8	Reinforced Concrete	Air - Outdoor	Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B2-1 III.B3-1 III.B5.1 (T-29)	3.5.1-40	A
				Cracking Loss of Material	Fire Protection and Structures Monitoring	VII.G-30 (A-92)	3.3.1-66	A, 534
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-31 (A-93)	3.3.1-67	A, 534
			Air - Indoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 III.A5-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 III.A5-10 (T-06)	3.5.1-24	A

TABLE 3.5.2-16 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – MISCELLANEOUS STRUCTURES

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Below Grade	C-2 C-6 C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
Concrete: Foundation	C-2 C-6 C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A

TABLE 3.5.2-16 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – MISCELLANEOUS STRUCTURES

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Door (Non-fire)	C-8	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
		Stainless Steel	Air - Indoor	None	None	III.B5-5 (TP-5)	3.5.1-59	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B4-7 (TP-6)	3.5.1-50	C, 532
Fire Hose Stations	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures	C-2 C-6 C-7 C-8	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	A
			Soil	Loss of Material	One-Time Inspection			J, 523
		Stainless Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B4-7 (TP-6)	3.5.1-50	C, 532

TABLE 3.5.2-16 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – MISCELLANEOUS STRUCTURES

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-7	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
		Aluminum	Air - Indoor	None	None	III.B3-2 (TP-8)	3.5.1-58	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B4-7 (TP-6)	3.5.1-50	C, 532
		Stainless Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B4-7 (TP-6)	3.5.1-50	C, 532
Seals and Gaskets	C-8	Elastomer	Air - Outdoor	Cracking Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 509
Steel Components: All Structural Steel	C-7	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.A3-12 (T-11)	3.5.1-25	A
Supports for Non-ASME Piping & Components	C-7	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A

TABLE 3.5.2-17 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – SWITCHYARD FOR CRYSTAL RIVER SITE

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-7	Carbon Steel	Reinforced Concrete	None	None			J, 501
Battery Racks	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B2-5 (TP-11)	3.5.1-58	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A
		Aluminum	Air - Indoor	None	None	III.B2-4 (TP-8)	3.5.1-58	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A
Concrete: Above Grade	C-7	Reinforced Concrete	Air - Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A

TABLE 3.5.2-17 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – SWITCHYARD FOR CRYSTAL RIVER SITE

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Above Grade (continued)	C-7	Reinforced Concrete	Air - Outdoor	Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B2-1 (T-29)	3.5.1-40	A
			Air - Indoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B2-1 III.B3-1 III.B5-1 (T-29)	3.5.1-40	A
Concrete: Below Grade	C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A

TABLE 3.5.2-17 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – SWITCHYARD FOR CRYSTAL RIVER SITE

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Foundation	C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures	C-7	Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	A
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A

TABLE 3.5.2-17 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – SWITCHYARD FOR CRYSTAL RIVER SITE

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steel Components: All Structural Steel	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.A3-12 (T-11)	3.5.1-25	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.A3-12 (T-11)	3.5.1-25	A
		Galvanized Carbon Steel	Air - Outdoor	Loss of Material	Structures Monitoring	III.B4-7 (TP-6)	3.5.1-50	C, 532

TABLE 3.5.2-18 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – SWITCHYARD RELAY BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-7	Carbon Steel	Reinforced Concrete	None	None			J, 501
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B2-5 (TP-11)	3.5.1-58	A
		Aluminum	Air - Indoor	None	None	III.B2-4 (TP-8)	3.5.1-58	A
Concrete: Above Grade	C-7	Reinforced Concrete	Air - Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
			Air - Indoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B2-1 III.B3-1 (T-29)	3.5.1-40	A

TABLE 3.5.2-18 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – SWITCHYARD RELAY BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Below Grade	C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
Concrete: Foundation	C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A

TABLE 3.5.2-18 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – SWITCHYARD RELAY BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Door (Non-fire)	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
Masonry Walls	C-7	Concrete Block	Air - Indoor	Cracking	Masonry Wall	III.A3-11 (T-12)	3.5.1-43	A
			Air - Outdoor	Cracking	Masonry Wall	III.A3-11 (T-12)	3.5.1-43	A
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B3-3 (TP-11)	3.5.1-58	A
Roof-Membrane / Built-Up	C-7	Elastomer	Air - Outdoor	Cracking Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 529
Steel Components: All Structural Steel	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.A3-12 (T-11)	3.5.1-25	A

TABLE 3.5.2-19 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – TURBINE BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-7	Carbon Steel	Reinforced Concrete	None	None			J, 501
		PVC	Reinforced Concrete	None	None			J, 501
Battery Racks	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
Cable Tray, Conduit, HVAC Ducts, Tube Track	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B2-5 (TP-11)	3.5.1-58	A
		Aluminum	Air - Indoor	None	None	III.B2-4 (TP-8)	3.5.1-58	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A
Concrete: Above Grade	C-4 C-7 C-8	Reinforced Concrete	Air - Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B2-1 (T-29)	3.5.1-40	A

TABLE 3.5.2-19 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – TURBINE BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Above Grade (continued)	C-4 C-7 C-8	Reinforced Concrete	Air - Outdoor	Cracking Loss of Material	Fire Protection and Structures Monitoring	VII.G-30 (A-92)	3.3.1-66	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-31 (A-93)	3.3.1-67	A
			Air - Indoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B2-1 III.B3-1 III.B5-1 (T-29)	3.5.1-40	A
				Cracking Loss of Material	Fire Protection and Structures Monitoring	VII.G-28 (A-90)	3.3.1-65	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-29 (A-91)	3.3.1-67	A

TABLE 3.5.2-19 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – TURBINE BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Below Grade	C-7 C-8	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
Concrete: Foundation	C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A

TABLE 3.5.2-19 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – TURBINE BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Damper Mountings	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B4-10 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B4-5 (TP-11)	3.5.1-58	A
Door (Non-Fire)	C-3 C-8	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
Door	C-4	Carbon Steel	Air - Indoor	Loss of Material	Fire Protection and Structures Monitoring	VII.G-3 (A-21) VII.G-4 (A-22)	3.3.1-63	E
			Air - Outdoor	Loss of Material	Fire Protection and Structures Monitoring	VII.G-3 (A-21) VII.G-4 (A-22)	3.3.1-63	E
Fire Barrier Penetration Seals	C-4	Fire Proofing Materials	Air - Indoor	Loss of Material Cracking / Delamination Separation Change in Material Properties	Fire Protection	VII.G-1 (A-19)	3.3.1-61	A
			Air - Outdoor	Loss of Material Cracking Delamination Separation Change in Material Properties	Fire Protection	VII.G-2 (A-20)	3.3.1-61	A

TABLE 3.5.2-19 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – TURBINE BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fire Hose Stations	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
Floor Drains	C-8	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 522
		Stainless Steel	Air - Indoor	None	None	III.B5-5 (TP-5)	3.5.1-59	C, 522
Masonry Walls	C-7	Concrete Block	Air - Indoor	Cracking	Masonry Wall	III.A3-11 (T-12)	3.5.1-43	A
			Air - Outdoor	Cracking	Masonry Wall	III.A3-11 (T-12)	3.5.1-43	A
Phase Bus Duct Enclosure Assemblies	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	VI.A-13 (LP-06)	3.6.1-09	A
		Aluminum	Air - Indoor	None	None	III.B3-2 (TP-8)	3.5.1-58	A
		Stainless Steel	Air - Indoor	None	None	III.B3-5 (TP-5)	3.5.1-59	A
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures	C-7 C-8 C-11	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B5-3 (TP-11)	3.5.1-58	A
		Stainless Steel	Air - Indoor	None	None	III.B5-5 (TP-5)	3.5.1-59	A

TABLE 3.5.2-19 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – TURBINE BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
		Galvanized Carbon Steel	Air - Indoor	None	None	III.B3-3 (TP-11)	3.5.1-58	A
		Aluminum	Air - Indoor	None	None	III.B3-2 (TP-8)	3.5.1-58	A
		Stainless Steel	Air - Indoor	None	None	III.B3-5 (TP-5)	3.5.1-59	A
Roof-Membrane / Built-up	C-7	Elastomer	Air - Outdoor	Cracking Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 529
Seals and Gaskets	C-8	Elastomer	Air - Outdoor	Cracking Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 509
Siding	C-7	Aluminum	Air - Indoor	None	None	III.B5-2 (TP-8)	3.5.1-58	C, 522
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B4-7 (TP-6)	3.5.1-50	C, 532
Steel Components: All Structural Steel	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.A3-12 (T-11)	3.5.1-25	A

TABLE 3.5.2-19 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – TURBINE BUILDING

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Supports for EDG, HVAC System Components, and Other Miscellaneous Mechanical Equipment	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B4-10 (T-30)	3.5.1-39	A, 518
		Elastomer	Air - Indoor	Reduction or Loss of Isolation Function	Structures Monitoring	III.B4-12 (T-31)	3.5.1-41	A, 538
Supports for Non-ASME Piping & Components	C-7	Carbon Steel	Air - Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Air - Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Stainless Steel	Air - Indoor	None	None	III.B2-8 (TP-5)	3.5.1-39	A

Notes for Tables 3.5.2-1 through 3.5.2-19:

Generic Notes:

A. Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B. Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C. Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

D. Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

E. Consistent with NUREG-1801 item for material, environment, and aging effect, but a different AMP is credited or NUREG-1801 identifies a plant-specific AMP.

F. Material not in NUREG-1801 for this component.

G. Environment not in NUREG-1801 for this component and material.

H. Aging effect not in NUREG-1801 for this component, material and environment combination.

I. Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

J. Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant-specific Notes:

501. The CR-3 aging management review methodology concluded that carbon/low alloy steel, galvanized carbon steel, stainless steel, and PVC completely encased in concrete has no aging effect. There is not a corresponding component/commodity in NUREG-180,1 Chapter II or III. However, NUREG-1801 Items RP-01, RP-06, EP-5, EP-20, SP-2, SP-13, and AP-19 which apply to carbon steel and stainless steel mechanical piping and components embedded in concrete validate there are no aging effects for stainless steel and carbon steel embedded in concrete.

502. The aging management review methodology concluded that Thermo-lag in this environment is susceptible to the aging effect of loss of material and cracking and/or delamination, and separation.

503. The expansion bellows is between the Fuel Transfer Tube and the transfer canal inside the Reactor Building. The expansion bellows is not a “Penetration sleeve; Penetration bellows” from NUREG-1801, II.A3-4, but is of the same material, in the same environments, has the same aging effects, and is a TLAA which is consistent with the aging management program column in NUREG-1801. This expansion bellows was determined to have a design cycle life and is evaluated as a TLAA. The expansion bellows is subject to an Air - Indoor environment normally but is subject to a treated water environment while the Reactor Building Refueling Canal is flooded during reactor fuel movements.

504. The following: Cranes; Expansion Bellows; Fire Barrier Assemblies (Wrap only), and Steel Components: Fuel Pool Liner are aligned with NUREG-1801, Item III.B5-5 or III.B5-6, as a “Miscellaneous Structure;” because they have the same material, environment, aging effect and aging management program, although they are not the same NUREG-1801 component “Support members; welds, bolted connections, support anchorage to building structure.”

505. The Expansion Bellows is aligned with NUREG-1801, Item III.A5-13, as "Steel Components: Fuel Pool Liner" because it has the same material, environment, aging effect and aging management program; although it is not the same NUREG-1801 component.

506. The aging management review methodology concluded that the Insulation on piping in mechanical penetrations, in the Air-Indoor environment, has no aging effects.

507. The Moisture Barrier is the only part of the "Seals, Gaskets, and Moisture Barriers" commodity to which the ASME Section XI, Subsection IWE Program applies.

508. The components Floor Drains, or Steel Components: All structural steel, or Penetration Sleeves or Steel Elements: Liner; Liner Anchors; Integral Attachments are aligned with NUREG-1801, III.B5-8, as a "Miscellaneous Structure;" because they have the same material, environment, aging effect and aging management program, although they are not the same NUREG-1801 component "Support members; welds; bolted connections; support anchorage to building structure."

509. The Seals and Gaskets component is aligned with NUREG-1801, III.A6-12, because it has the same material, environment, aging effect and aging management program although it is not a NUREG-1801 Group 6 Water Control Structure. There is not a NUREG-1801 Group 3, 4, 5 or Group 8 Seals and Gaskets component provided in NUREG-1801. Cracking and change in material properties for elastomers results in loss of sealing and is considered an equivalent aging effect.

510. The same aging effect used for NUREG-1801, Items III.A4-6, for Lubrite plates (Lock-up) is assigned to Fluorogold slide bearing plates used on structural steel. In addition, CR-3 determined change in material properties due to radiation is an applicable aging effect. The Structures Monitoring Program is credited for inspecting the slide bearing plates which includes the Fluorogold plates.

511. The same aging effect used for NUREG-1801, Items III.B1.1-5 and III.B1.2-3, for Lubrite plates (loss of mechanical function) is assigned to Fluorogold slide bearing plates used on supports. In addition, CR-3 determined change in material properties due to radiation is an applicable aging effect. The ASME Section XI, Subsection IWF Program is credited for inspecting the slide bearing plates which includes the Fluorogold plates.

512. NUREG-1801 item III.A5-13 is for the Fuel Pool Liner. This NUREG-1801 line item was selected because the Reactor Cavity liner / Refueling Canal liner in the Reactor Building has the same material, environment (during refueling), aging effects, and aging management programs as the Fuel Pool Liner.

513. Component Type includes the exterior surface of the stainless steel fuel transfer tubes, blind flanges, bolting, and cover plates and the dissimilar metal welds at the stainless steel fuel transfer tube / carbon steel penetration sleeve interface located in the Reactor Building because the fuel transfer tube is examined by the ASME Section XI, Subsection IWE Program and the 10 CFR Part 50, Appendix J Program. The aging management review methodology concluded cracking due to SCC in the Air-indoor environment was not applicable because the stainless is not exposed to an aggressive environment.

514. NUREG-1801 item II.A1-7 discusses groundwater/soil environment but groundwater/soil environment is not listed in the environment column. A Soil environment has been applied in the environment column similar to Item III.A3-4.

515. Includes the RB Polar Crane, Reactor Vessel Tool Handling Jib Crane, 5-Ton Jib Crane, Control Rod Drive Mechanism Jib Crane, and the Main Fuel Handling Bridge Crane.

516. The component Floor Drains is aligned with NUREG-1801, Volume 2, Item III.B5-7, as "Miscellaneous Structures;" because it has the same material, environment, aging effect and aging management program, although it is not the same NUREG-1801 component, i.e., "Support members; welds; bolted connections; support anchorage to building structure."

517. The aging management review methodology concluded that galvanized steel in an Air-Outdoor environment is susceptible to the aging effect of Loss of Material. NUREG 1801, Groups B3, B5, and A3-12, do not have an equivalent material/environment combination that can be aligned to. Therefore, the miscellaneous structures noted are aligned with III.B4-7 to obtain a consistent aging effect and aging management program.
518. Includes only metallic vibration isolators for the ventilation equipment.
519. Draft Stops are sheet-metal curtains located around stairwell ceilings that have a 10 CFR 54.4(a)(2) intended function.
520. The CR-3 aging management review methodology concluded that loss of material (due to abrasion; cavitation) is an applicable aging effect/mechanism. This commodity is aligned with NUREG 1801, III.A6-7, because it has the same material, environment, aging effect, and aging management program, although it is not the same NUREG-1801 component.
521. The Seals and Gaskets component for the sealing/caulking of the BWST to its concrete shield wall is aligned with NUREG-1801, III.A6-12, because it has the same material, environment, aging effect, and aging management program although it is not a NUREG-1801 Group 6 Water Control Structure. Cracking and change in material properties for elastomers results in loss of sealing and is considered an equivalent aging effect.
522. The components “Door (Non-Fire)” or “Floor Drains” or “Fire Hose Stations” or “Steel Components: All structural steel” or “Steel Components: Fuel Pool Liner” or “Raised Floor” or “Siding” or “Draft Stops” are aligned with Other Miscellaneous Structures (Grouping III.B5); because they are the same materials, environments, aging effects and aging management programs, although they are not the same NUREG-1801 component.
523. The Diesel Fuel Oil Tank is held in place by steel hold-down straps that are buried in soil and, therefore, inaccessible. For the purpose of the aging management review, the hold-down straps were considered as a miscellaneous structure; and no credit was taken for the coal-tar epoxy equivalent to Bitumastic 300-M coating provided. The evaluation determined that the hold-down straps would have an aging effect of loss of material without credit for the coating. The coated hold-down straps were originally installed for the current 40-year licensing period, and it is concluded that a One-Time inspection be performed for the strap area at the top of the tank just prior to extended life (within two years of 2016). The One-Time inspection is used to determine that the hold-down straps do not have any deficiencies that could prevent the straps from performing their function.
524. Aging effects are not applicable for “Unreinforced Concrete or Fabriform.”
525. The CR-3 aging management review methodology concluded that copper materials in an Air - Indoor or Borated Water Leakage environment have no aging effect. This applies only to straps for copper tubing.
526. Fire Barrier Assemblies include Thermo-lag or Mecatiss Fire Barriers.
527. The CR-3 methodology concluded that stainless steel conduits and support steel located in the Dedicated EFW Tank Enclosure Building northwest corner recessed area (similar to a sump) will have the aging effect of Loss of Material.
528. The CR-3 aging management review methodology determined that there are no aging effects for Boral. There has been no adverse operating experience recorded for CR-3 or Harris Nuclear Plant. Both the V. C. Summer Nuclear Station and the Brunswick Steam Electric Plant have been evaluated by the NRC staff for these aging effects, and the License Renewal Safety Evaluation Reports for those plants have determined the aging effects to be insignificant.
529. The Roof-Membrane / Built-up component is aligned with NUREG-1801, III.A6-12, because it has the same material, environment, aging effect and aging management program although it is not a NUREG-1801 Group 6 Water Control Structure. There is not a NUREG-1801 Group 3 or Group 4 Seals and Gaskets, and Moisture Barrier component provided in NUREG-1801. Cracking and change in material properties for elastomers results in loss of sealing and is considered an equivalent aging effect.

530. The CR-3 aging management review methodology concluded that there are negligible aging effects associated with the Control Room ceiling Willtec foam panels. Additionally, plant operating experience has identified no aging effects.

531. NUREG-1801 allows use of the “Structures Monitoring Program” instead of the “Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Plants” aging management program if the plant is not committed to RG 1.127.

532. The components ”Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and other Miscellaneous Structures”, “Siding”, “Steel Components: All Structural Steel,” “Door (Non-fire),” or “Racks, Panels, Cabinets, and Enclosure for Electrical Equipment and Instrumentation” are aligned with “Supports for EDG, HVAC System Components and Other Miscellaneous Mechanical Equipment;” because they have the same materials, environments, aging effects, and aging management programs, although they are not the same NUREG-1801 component.

533. The Borated Water Leakage environment applies only to the Nuclear Sampling Room.

534. The Fire Protection intended function only applies to the Transformer area 3-hour firewall.

535. For the Auxiliary Building, includes the 120-Ton Fuel Handling Area Crane, the Spent Fuel Pit Missile Shield Crane, and the Spent Fuel Pool Handling Bridge Crane. For the EFW Pump Building, includes the EFW Pump Building 3-Ton Crane. For the Circulating Water Intake Structure, includes the Intake Gantry Crane.

536. The Seals and Gaskets commodity group only applies to caulking for the concrete plugs on the Auxiliary Building roof (Elevation 119 ft.-0 in.) south of the BWST.

537. The CR-3 aging management review methodology concluded that stainless steel in Raw Water - Seawater has an aging effect of loss of material for the Trash Racks and associated support structure.

538. This line item includes only non-metallic vibration isolators for the ventilation system.

539. This line item applies to the Machine Room concrete walls at Control Complex elevation 181 ft.-4 in. only.

540. The CR-3 aging management review methodology determined that Carborundum (B_4C) has the aging effect Loss of Material, which will be managed by the Carborundum (B_4C) Monitoring Program.

541. This line item includes the Drain Trench Weir.

542. The expansion bellows is between the Fuel Transfer Tube and the Spent Fuel Pool liner plate located inside the Auxiliary Building. The expansion bellows is not a “Penetration sleeve; Penetration bellows” from NUREG-1801, II.A3-4, but is of the same material, in the same environments, has the same aging effects, and is a TLAA, which is consistent with the aging management program column in NUREG-1801. This expansion bellows was determined to have a design cycle life and is evaluated as a TLAA. The expansion bellows is subject to a treated water environment.

543. NUREG-1801 only addresses “corrosion of embedded steel” or “aggressive chemical attack” for a ground water/soil environment. In Group 3 and Group 6 structures, NUREG-1801 does not address “corrosion of embedded steel” or “aggressive chemical attack” in a Raw Water environment. CR-3 Group 3 and Group 6 structures have concrete components in a Raw Water environment. Raw Water - Seawater is aggressive at CR-3 because the sulfate content is greater than 1500 ppm and the chloride content is greater than 500 ppm. Concrete cracking, loss of material, and change in material properties are applicable aging effects for the submerged concrete. The Structures Monitoring Program is used to manage aging effects of submerged concrete for loss of material, cracking, and change in material properties.

544. NUREG-1801 Group 8 structures do not address corrosion of embedded steel and aggressive chemical attack in Air-Indoor or Air-Outdoor environments. The CR-3 methodology used NUREG-1801 Group 3 structures for potential aging effects to concrete.

545 Concrete in a treated water environment in the Dedicated EFW Tank Enclosure Building north-west corner recessed area has been conservatively evaluated as a groundwater environment to provide potential aging effects.

546. The CR-3 aging management review methodology concluded that carbon steel in a treated water environment has the aging effect of Loss of Material.

547. The CR-3 aging management review methodology conservatively applied Loss of Mechanical Function to a Treated Water environment to agree with Air-Indoor and Air-Outdoor environments.

548. This item includes the anchor bolts for Reactor Coolant System (Reactor Pressure Vessel, Reactor Coolant Pump, Pressurizer, and Steam Generator Lateral Supports) components.

549. The same aging effect used for NUREG-1801 Items III.B1.1-5 and III.B1.2-3 for Lubrite plates (loss of mechanical function) is assigned to Fluorogold slide bearing plates used on supports. The ASME Section XI, Subsection IWF or Structures Monitoring Program is credited for inspecting the slide bearing plates which includes the Fluorogold plates.

550 The Reinforced Concrete material for the Wave Embankment Structure includes any unreinforced concrete and the Fabriform used on the slope of the Berm.

551 The same aging effect used for NUREG-1801 Item III.A4-6 for Lubrite plates (i.e., Lock-up) is assigned to Fluorogold slide bearing plates used on structural steel. The Structures Monitoring Program is credited for inspecting the slide bearing plates which includes the Fluorogold plates.

[This page intentionally blank]

3.6 AGING MANAGEMENT OF ELECTRICAL AND INSTRUMENTATION AND CONTROLS

3.6.1 INTRODUCTION

Section 3.6 provides the results of the aging management reviews (AMRs) for those components/commodities identified in Subsection 2.5, Scoping and Screening Results – Electrical and Instrumentation and Control (I&C) Systems that require AMR. The components/commodities subject to AMR are:

1. Non-Environmentally Qualified (EQ) Insulated Cables and Connections (Subsection 2.5.4.1)

   The commodity Non-EQ Insulated Cables and Connections was divided into the following groups in order to better align with the component types in NUREG-1801 and to include plant-specific commodities. These groups are used in the AMR summary table referenced in Subsection 3.6.2, Results, below:
   a. Cable connections-metallic parts, This commodity group corresponds to cable connections (metallic parts), item VI.A-1 from NUREG-1801,
   b. Insulated Cables and Connections. This commodity group corresponds to conductor insulation for electrical cables and connections, Item VI.A-2 from NUREG-1801,
   c. Cables and Connections Used in Instrumentation Circuits. This group aligns with conductor insulation for electrical cables and connections used in instrumentation circuits that are sensitive to reduction in conductor insulation resistance (IR), Item VI.A-3 from NUREG-1801,
   d. Medium-voltage Power Cables. This corresponds to conductor insulation for inaccessible medium-voltage cables, Item VI.A-4 from NUREG-1801,
   e. Electrical Connector Contacts Exposed to Borated Water Leakage, which corresponds to connector contacts for electrical connectors exposed to borated water leakage, Item VI.A-5 from NUREG-1801, and
   f. Fuse Holders. This commodity corresponds to those addressing insulation and metallic parts of fuse holders (not part of a larger assembly), Items VI.A-6, -7 and -8 from NUREG-1801.

2. Electrical Portions of Non-EQ Electrical/I&C Penetration Assemblies (Subsection 2.5.4.2)

3. Metal Enclosed Bus and Connections (Subsection 2.5.4.3)

   The commodity Metal Enclosed Bus (MEB) and Connections was divided into the following groups in order to better align with the component types in NUREG-1801.
   a. MEB - Bus/Connections, which align with NUREG-1801, Item VI.A-11,

b. MEB - Enclosure Assemblies (elastomers) which align with NUREG-1801, Item VI.A-12,
c. MEB - Enclosure Assemblies (metal), which align with NUREG-1801, Item VI.A-13 (Refer to Table 3.6.1, Item 3.6.1-09.).
d. MEB - Insulation/Insulators, which align with NUREG-1801, Item VI.A-14.

4. High-voltage Insulators (Subsection 2.5.4.4)

5. Switchyard Bus and Connections (Subsection 2.5.4.5)

6. Transmission Conductors and Connections (Subsection 2.5.4.6)

Table 3.6.1, Summary of Aging Management Evaluations in Chapter VI of NUREG-1801 for Electrical Components, provides the summary of the programs evaluated in NUREG-1801 that are applicable to component/commodity groups in this Section. Table 3.6.1 uses the format of Table 1 described in Section 3.0 above.

3.6.1.1 Operating Experience

The AMR methodology applied at CR-3 included use of operating experience (OE) to confirm the set of aging effects that had been identified through material/environment evaluations. Plant-specific and industry OE was identified and reviewed. The OE review consisted of the following:

Site: The review of site-specific, CR-3 OE included a review of the Action Tracking Database, Maintenance Rule documentation, Licensee Event Reports, the CR-3 System Notebooks, and interviews with CR-3 engineering personnel. The site-specific OE review identified no additional or unique aging effects requiring management.

Industry: Industry OE was obtained from SAND96-0344, “Aging Management Guideline for Commercial Nuclear Power Plants – Electrical Cable and Terminations,” September 1996, which consolidates historical maintenance and industry OE for evaluation of aging mechanisms and effects. Additional generic OE was obtained in Revision 1 of NUREG-1801, "Generic Aging Lessons Learned (GALL)," U. S. Nuclear Regulatory Commission, September 2005. Draft Revision 1 of NUREG-1801 was issued in January 2005; more recent OE was captured by means of the Progress Energy OE review process and by a review of correspondence such as NRC Information Notices and Generic Letters, 10 CFR 21 reports, and vendor and INPO publications. The industry OE review identified no additional aging effects requiring management.

On-Going — On-going review of plant-specific and industry operating experience is continuing to be performed in accordance with the Corrective Action Program and the Progress Energy internal OE review process.

3.6.2 RESULTS

The following table summarizes the results of the aging management review for components/commodities in the Electrical and I&C Systems area.

Table 3.6.2-1 Electrical and I&C Systems – Summary of Aging Management Evaluation – Electrical/I&C Components/Commodities

This table uses the format of Table 2 described in Section 3.0.

3.6.2.1 Materials, Environment, Aging Effects Requiring Management and Aging Management Programs

The materials from which specific components/commodities are fabricated, the environments to which they are exposed, the aging effects requiring management, and the aging management programs used to manage these aging effects are provided for each component/commodity in the following subsections.

3.6.2.1.1 Non-EQ Insulated Cables and Connections

Materials

The primary cable and connection insulation materials are:

I&C Cable Insulation
- PE
- EPR, EP
- SR
- FEP, Teflon
- XLP, XLPE, XLPO
- PVC
- EPDM
- ETFE
- Kerite FR, (HI-70)
- Kerite HTK
- Kerite FR3

Power Cable Insulation
- EPR, EP
- TRXLPE
- Kerite FR, (HI-70)
- Kerite HTK
- Kerite FR3

Connections
- EPR, EP
- XLP, XLPE, XLPO
- Melamine
- Nylon
- Phenolic
- Porcelain
- Kapton
- EPDM

The materials of construction for metallic parts of electrical connections are:
- Various metals
- Copper Alloy

Environment

The Non-EQ Insulated Cables and Connection components may be exposed to:

- Air - Indoor
- Air - Outdoor
- Adverse Localized Environment caused by Heat, Radiation, or Moisture in the Presence of Oxygen
- Adverse Localized Environment Caused by Exposure to Moisture and Voltage
- Air with Borated Water Leakage

An adverse, localized environment is defined as a condition in a limited plant area that is significantly more severe than the specified service condition for the equipment.

Aging Effects Requiring Management

The Non-EQ Insulated Cables and Connection components are subject to the following aging effects requiring management:

- Loosening of Bolted Connections
- Reduced Insulation Resistance
- Electrical Failure (breakdown of insulation)
- Corrosion of Connector Contact Surfaces
- Loss of Continuity

Aging Management Programs

The following AMPs manage the aging effects for the Non-EQ Insulated Cables and Connection components:

- Boric Acid Corrosion Program
- Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program
- Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program
- Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program
- Fuse Holder Program
- Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program

3.6.2.1.2 Electrical Portions of Non-EQ Electrical/I&C Penetration Assemblies

Materials

The materials of construction for the Electrical Portions of Non-EQ Electrical/I&C Penetration Assemblies components are:

- XLPO
- SR
- Kapton
- EPDM
- CSPE
- EPR
- Kynar (PVDF)

Environment

The Electrical Portions of Non-EQ Electrical/I&C Penetration Assemblies are exposed to the following:

- Adverse Localized Environment caused by Heat, Radiation, or Moisture in the Presence of Oxygen

Aging Effects Requiring Management

The Electrical Portions of Non-EQ Electrical/I&C Penetration Assemblies components are subject to the following aging effects requiring management:

- Reduced Insulation Resistance
- Electrical Failure (breakdown of insulation)

Aging Management Programs

The following AMP manages the aging effects for the Electrical Portions of Non-EQ Electrical/I&C Penetration Assemblies components:

- Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program

3.6.2.1.3 Metal Enclosed Bus and Connections

Materials

The materials of construction for the Metal Enclosed Bus and Connections components are:

- Aluminum
- Copper
- Elastomers

- Fiberglass
- Phenolic
- Porcelain
- Organic Polymers
- Silver-Plated Aluminum
- Steel

Environment

The Metal Enclosed Bus and Connections components are exposed to the following:
- Air - Indoor
- Air - Outdoor

Aging Effects Requiring Management

The Metal Enclosed Bus and Connections components are subject to the following aging effects requiring management:
- Loosening of Bolted Connections
- Hardening and Loss of Strength
- Reduced Insulation Resistance
- Electrical Failure

Aging Management Programs

The following AMP manages the aging effects for the Metal Enclosed Bus and Connections components:
- Metal Enclosed Bus Program

3.6.2.1.4 High-Voltage Insulators

Materials

The materials of construction for the High-Voltage Insulators are:
- Porcelain
- Galvanized metals
- Cement

Environment

The High-Voltage Insulators are exposed to the following:
- Air - Outdoor

Aging Effects Requiring Management

The High-Voltage Insulator components are subject to the following aging effects requiring management:

- Degradation of Insulation Quality
- Loss of Material

Aging Management Programs

The following AMP manages the aging effects for the High-Voltage Insulator components:

- High-Voltage Insulators in the 230KV Switchyard Program

3.6.2.1.5 Switchyard Bus and Connections

Materials

The materials of construction for the Switchyard Bus and Connections components are:

- Aluminum
- Stainless Steel
- Galvanized Steel

Environment

The Switchyard Bus and Connections components are exposed to the following:

- Air - Outdoor

Aging Effects Requiring Management

The AMR determined that the aging effects for the Switchyard Bus and Connections components are not significant and require no aging management activities.

Aging Management Programs

The AMR determined that no aging management activities are required for the Switchyard Bus and Connections components.

3.6.2.1.6 Transmission Conductors and Connections

Materials

The materials of construction for the Transmission Conductors and Connections components are:

- Aluminum
- Steel

Environment

The Transmission Conductors and Connections components are exposed to the following:

- Air - Outdoor

Aging Effects Requiring Management

The AMR determined that the aging effects for the Transmission Conductors and Connections components are not significant and require no aging management activities.

Aging Management Programs

The AMR determined that no aging management activities are required for the Transmission Conductors and Connections components.

3.6.2.2 Further Evaluation of Aging Management as Recommended by NUREG-1801

NUREG-1801 provides the basis for identifying those programs that warrant further evaluation by the reviewer in the LRA. For the Electrical and I&C Systems, those programs are addressed in the following subsections.

3.6.2.2.1 Electrical Equipment Subject to Environmental Qualification

As discussed in Section X.E1 of NUREG-1801, aging evaluations performed in accordance with the Environmental Qualification (EQ) Program may involve a time-limited aging analysis (TLAA) as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c)(1). The evaluation of EQ TLAAs is addressed separately in Section 4.4.

3.6.2.2.2 Degradation of Insulator Quality Due to Presence of Salt Deposits and Surface Contamination, and Loss of Material Due to Mechanical Wear

Salt and Surface Contamination

In accordance with NUREG-1801, degradation of insulator quality due to the presence of any salt deposits and surface contamination could occur in high-voltage insulators. Various airborne materials such as dust, salt and industrial effluents can contaminate insulator surfaces. Surface contamination can be a problem in areas where there are greater concentrations of airborne particles due to proximity to facilities that discharge soot or proximity to the ocean where salt spray is prevalent. A large buildup of contamination enables the conductor voltage to track along the surface more easily and can lead to insulator flashover. The buildup of surface contamination is typically a slow, gradual process that is even slower for rural areas with generally less suspended particles and SO_2 concentrations in the air than urban areas. Although CR3 is located in a rural area, it is in close proximity to the Gulf of Mexico. Site OE has shown that flashover of overhead transmission line insulators due to contamination from salt spray is an applicable aging mechanism that requires management. This aging mechanism is not applicable to the station post insulator in the 230KV Switchyard. Flashover of station post insulators has not been experienced at CR3. This is attributed to the fact that station post insulators are oriented vertically whereas the overhead transmission line insulators may be angled to form various “string” configurations depending on the design application making them more susceptible to surface contamination. Also, the overall length of a station post insulator is often longer than that of overhead transmission line insulators to meet the necessary clearance requirements for personnel safety in the switchyard. The longer overall length of a station post insulator increases the “creepage distance” of the insulator making it less susceptible to surface contamination.

Therefore, a plant-specific High-Voltage Insulators in the 230KV Switchyard Program will be implemented to preclude the buildup of surface contamination on overhead transmission line insulators in the 230KV Switchyard.

Mechanical Wear

As stated in NUREG-1801, loss of material due to mechanical wear caused by wind could occur in high-voltage insulators. Loss of material due to mechanical wear is an aging effect for strain and suspension insulators if they are subject to significant movement. Movement of the insulators can be caused by wind blowing the supported transmission conductor, causing it to swing from side to side. If this swinging is frequent enough, it could cause wear in the metal contact points of the insulator string and between an insulator and the supporting hardware. Site OE has shown that mechanical wear resulting in loss of material to the steel pins connecting the insulators to one another is an applicable aging effect that requires management for the overhead transmission line insulators in the 230KV Switchyard. This aging mechanism is not applicable to the station post insulator in the 230KV Switchyard. Station post insulators do not have steel swivel points like overhead transmission line insulators and are not susceptible to mechanical wear due to their mounting configuration. Therefore, a plant-specific High-Voltage Insulators in the 230KV Switchyard Program will be implemented to mitigate this aging mechanism on overhead transmission line high-voltage insulators in the 230KV Switchyard.

3.6.2.2.3 Loss of Material Due to Wind-Induced Abrasion and Fatigue, Loss of Conductor Strength Due to Corrosion, and Increased Resistance of Connection Due to Oxidation or Loss of Preload

Switchyard Bus and Connections

The switchyard buses within the scope of this review consist of 4 in. integral web channel bus (IWCB) constructed of rectangular aluminum. The switchyard buses are connected to short lengths of flexible conductors that do not normally vibrate and are supported by station post insulators mounted to static, structural components such as cement footings and structural steel. Based on this design configuration, wind induced vibration is not an applicable aging mechanism.

With no connections to moving or vibrating equipment, loss of material due to vibration is not an aging effect requiring management. Aluminum bus exposed to the service conditions of the 230KV Switchyard does not experience any appreciable aging effects, except for minor oxidation, which does not impact the ability of the switchyard bus to perform its intended function. Therefore, it is concluded that general corrosion resulting in the oxidation of the switchyard bus is not an aging effect requiring management.

The bolted connections associated with the switchyard bus are for the connections to station post insulators used to support the bus. Other connections to the bus are welded. The components involved in switchyard bus connections are constructed from cast aluminum, galvanized steel and stainless steel. No organic materials are involved. The station post insulators used to support the switchyard bus are bolted to the channel on the underside of the IWCB utilizing either galvanized or stainless steel bolts. Components in the 230KV Switchyard are exposed to precipitation. Connection materials exposed to the service conditions of the 230KV Switchyard do not experience any appreciable aging effects, except for minor oxidation, which does not impact the ability of the switchyard bus to perform its intended function. The steel bolting hardware used in this application has been selected because of its ability to inhibit rust. Based on operating experience, corrosion of the structural bolting used in this application is not significant enough to cause a loss of intended function.

Transmission Conductors and Connections

Transmission conductor mounting hardware loss of material due to wind induced abrasion and fatigue is an applicable aging mechanism but is not significant enough to cause a loss of intended function. Wind induced abrasion and fatigue could be caused by transmission conductor vibration resulting from wind loading. However, a high wind loading factor of 135 mph (with an additional safety factor for wind gusts) has been considered in the design and installation of transmission conductors in the CR-3 transmission and distribution network. Strong winds could cause the transmission conductors to sway from side to side. If this swinging is frequent enough, it could cause the transmission conductor's mounting hardware to wear. Although this mechanism is possible, experience has shown that the transmission conductors do not normally swing and when they do, because of strong winds, they dampen quickly once the wind has subsided. Therefore, it is concluded that mounting hardware loss of material caused by transmission conductor vibration (sway) and fatigue is not an aging effect requiring management.

Loss of transmission conductor strength due to corrosion is an applicable aging effect but ample design margin ensures that it is not significant enough to cause a loss of intended function. All CR-3 transmission conductors are Type ACSR (aluminum conductor steel reinforced). They are constructed of strand aluminum conductors wound around a steel core. No organic materials are involved. The most prevalent mechanism contributing to loss of conductor strength of an ACSR transmission conductor is corrosion, which includes corrosion of the steel core and aluminum strand pitting. For ACSR transmission conductors, degradation begins as a loss of zinc from the galvanized steel core wires. Corrosion rates depend largely on air quality, which includes suspended particles chemistry, SO_2 concentration in air, precipitation, fog chemistry, and meteorological conditions. Corrosion of ACSR transmission conductors is a very slow process that is even slower for rural areas with generally less suspended particles and SO_2 concentrations in the air than urban areas. CR-3 is located in a rural area where airborne particle concentrations are comparatively low. Consequently, this is not considered a significant contributor to this aging mechanism. There is a set percentage of composite conductor strength established at which a transmission conductor is replaced. The National Electrical Safety Code (NESC) requires that tension on installed conductors be a maximum of 60% of the ultimate conductor strength. The NESC also sets the maximum tension a conductor must be designed to withstand under heavy load requirements, which includes consideration of ice, wind, and temperature. Tests performed by Ontario Hydroelectric showed a 30% loss of composite conductor strength of an 80-year-old transmission conductor due to corrosion. Assuming a 30% loss of strength, there would still be significant margin between what is required by the NESC and actual conductor strength. These requirements were evaluated for applicability to the specific transmission conductors used at CR-3. CR-3 is in the light loading zone; therefore, the Ontario Hydroelectric heavy loading zone study is conservative. A typical 954 MCM ACSR transmission conductor used in the 230KV Switchyard will be used as an illustration. The ultimate strength of a 954 MCM (24/7 strand) ACSR conductor is 33,500 lbs and the maximum design tension for this conductor is 15,000 lbs. The margin between the maximum design tension and the ultimate strength is 18,500 lbs.; i.e., there is a 55.2% ultimate strength margin (18,500/33,500). The Ontario Hydroelectric study showed a 30% loss of composite conductor strength in an 80-year-old conductor. In the case of the CR-3 954 MCM ACSR transmission conductor, a 30% loss of ultimate strength would mean there would still be 25.2% ultimate strength margin between what is required by the NESC and the actual conductor strength in an 80-year old conductor. The CR-3 transmission conductors within the scope of this review have relatively short spans. Therefore, the tension exerted on the conductors in the 230KV Switchyard is less than would be experienced in typical transmission applications, which could be up to 1000 feet in length. This evaluation shows that there is ample design margin in the transmission conductors at CR-3. This analysis shows that the Ontario Hydroelectric test envelops the transmission conductors at CR-3; and, based on the conservatism in ultimate strength margin, demonstrates that loss of conductor strength is not an aging effect requiring management for the ACSR transmission conductors within the scope of this review. Therefore, no aging management activities are required for the period of extended operation.

Regarding the aging effect of increased electrical resistance, Switchyard Bus conductor connections are generally of the compression bolted category. No organic materials are involved. Components in the 230KV Switchyard are exposed to precipitation. Connection materials exposed to the service conditions of the CR-3 230KV Switchyard do not experience any appreciable aging effects, except for minor oxidation, which does not impact the ability of the switchyard bus to perform its intended function. CR-3 transmission conductor connection surfaces are coated with an anti-oxidant compound (a grease-type sealant) prior to tightening the connection to prevent the formation of oxides on the metal surface and to prevent moisture from entering the connection, thus reducing the chances of corrosion. Based on operating experience, this method of installation has been shown to provide a corrosion resistant low electrical resistance connection. Therefore, it is concluded that general corrosion resulting in the oxidation of switchyard connection surface metals is not an aging effect requiring management. The only bolted connections associated with the transmission conductors are for the connections to the switchyard bus and for the connections to the high voltage bushings on the Backup Engineered Safeguards Transformer (BEST). The aluminum bolting hardware used for the connections to the switchyard bus was selected to be compatible with the aluminum connector/conductor coefficient of thermal expansion. This ensures that the contact pressure of the bolt and washer combination used in the connector is maintained to the initial vendor specified torque value. CR-3 design incorporates the use of stainless steel “Belleville” washers on the bolted electrical connections to the main power transformers to compensate for temperature changes, maintain the proper torque, and prevent loosening of dissimilar metal connection hardware. This method of assembly is consistent with the good bolting practices recommended in EPRI Technical Report 1003471, "Bolted Joint Maintenance and Applications Guide," December 2002. Connection materials exposed to the service conditions of the CR-3 230KV Switchyard may experience minor oxidation but it is not significant enough to cause a loss of intended function.

3.6.2.2.4 Quality Assurance for Aging Management of Non-Safety Related Components

QA provisions applicable to License Renewal are discussed in Section B.1.3.

3.6.2.3 Time-Limited Aging Analysis

The Time-Limited Aging Analyses (TLAA) identified below are associated with Electrical and I&C System components.

1. Environmental Qualification Vendor Qualification Packages. Vendor Qualification Packages are aging analyses for components in the Environmental Qualification (EQ) Program. EQ of electrical components is a TLAA; refer to the discussion of Item 3.6.1-01 on Table 3.6.1 below.

2. Non-Environmental Qualification Electrical and I&C Components. Several non-EQ components that are in the scope of License Renewal have aging analyses that meet the definition of a TLAA. These consist of surge capacitors, control relays, overvoltage relays, and frequency relays for the Emergency Diesel Generators. These components are to be refurbished, or replaced, or have their qualification extended prior to reaching the end of their service lives. These activities are managed in accordance with the Corrective Action Program. Therefore, the effects of aging are being managed in accordance with 10 CFR 54.21(c)(1)(iii).

3. Non-Environmental Qualification Electrical and I&C Cables. Several non-EQ electrical cables that are in the scope of License Renewal have aging analyses that meet the definition of a TLAA. These consist of safety related and non-safety related electrical and I&C cables. These cables are to be replaced or have their qualification extended prior to reaching the end of their service lives. These activities are managed in accordance with the Corrective Action Program. Therefore, the effects of aging are being managed in accordance with 10 CFR 54.21(c)(1)(iii).

3.6.3 CONCLUSIONS

The Electrical and I&C System components/commodities having aging effects requiring management have been evaluated, and aging management programs have been selected to manage the aging effects. A description of the aging management programs is provided in Appendix B, along with a demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the demonstration provided in Appendix B, the effects of aging will be adequately managed so that there is reasonable assurance that the intended functions of Electrical and I&C Systems components/commodities will be maintained consistent with the current licensing basis during the period of extended operation.

TABLE 3.6.1 SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VI OF NUREG-1801 FOR ELECTRICAL COMPONENTS

Item Number	Component/ Commodity	Aging Effect/Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.6.1-01	Electrical equipment subject to 10 CFR 50.49 environmental qualification (EQ) requirements	Degradation due to various aging mechanisms	Environmental qualification of electric components	Yes, TLAA	Further evaluation of EQ TLAAs is documented in Subsection 3.6.2.2.1.
3.6.1-02	Electrical cables, connections and fuse holders (insulation) not subject to 10 CFR 50.49 EQ requirements	Reduced insulation resistance and electrical failure due to various physical, thermal, radiolytic, photolytic, and chemical mechanisms	Electrical cables and connections not subject to 10 CFR 50.49 EQ requirements	No	Consistent with NUREG-1801.
3.6.1-03	Conductor insulation for electrical cables and connections used in instrumentation circuits not subject to 10 CFR 50.49 EQ requirements that are sensitive to reduction in conductor insulation resistance (IR)	Reduced insulation resistance and electrical failure due to various physical, thermal, radiolytic, photolytic, and chemical mechanisms	Electrical Cables And Connections Not Subject to 10 CFR 50.49 EQ Requirements Used In Instrumentation Circuits	No	Consistent with NUREG-1801. This AMP applies to cable systems in the Nuclear Instrumentation and Radiation Monitoring Systems.
3.6.1-04	Conductor insulation for inaccessible medium voltage (2KV to 35KV) cables (e.g., installed in conduit or direct buried) not subject to 10 CFR 50.49 EQ requirements	Localized damage and breakdown of insulation leading to electrical failure due to moisture intrusion, water trees	Inaccessible medium voltage cables not subject to 10 CFR 50.49 EQ requirements	No	Consistent with NUREG-1801.

TABLE 3.6.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VI OF NUREG-1801 FOR ELECTRICAL COMPONENTS

Item Number	Component/ Commodity	Aging Effect/Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.6.1-05	Connector contacts for electrical connectors exposed to borated water leakage	Corrosion of connector contact surfaces due to intrusion of borated water	Boric Acid Corrosion	No	Consistent with NUREG-1801.
3.6.1-06	Fuse Holders (Not Part of a Larger Assembly): Fuse holders – metallic clamp	Fatigue due to ohmic heating, thermal cycling, electrical transients, frequent manipulation, vibration, chemical contamination, corrosion, and oxidation	Fuse holders	No	Fatigue due to ohmic heating, thermal cycling, electrical transients, frequent manipulation, vibration, and chemical contamination are not applicable aging effects. This is discussed in plant-specific Note 603 of Table 3.6.2-1. Loss of continuity due to corrosion and oxidation will be managed by the Fuse Holder Program.
3.6.1-07	Metal enclosed bus – Bus/connections	Loosening of bolted connections due to thermal cycling and ohmic heating	Metal Enclosed Bus	No	Consistent with NUREG-1801.
3.6.1-08	Metal enclosed bus – Insulation/insulators	Reduced insulation resistance and electrical failure due to various physical, thermal, radiolytic, photolytic, and chemical mechanisms	Metal Enclosed Bus	No	Consistent with NUREG-1801.
3.6.1-09	Metal enclosed bus – Enclosure assemblies	Loss of material due to general corrosion	Structures Monitoring Program	No	Consistent with NUREG-1801. CR-3 manages the aging effect with the Structures Monitoring Program. The AMR for this item is performed in Tables 3.5.2-6, 3.5.2-14, and 3.5.2-19.

TABLE 3.6.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VI OF NUREG-1801 FOR ELECTRICAL COMPONENTS

Item Number	Component/ Commodity	Aging Effect/Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.6.1-10	Metal enclosed bus – Enclosure assemblies	Hardening and loss of strength due to elastomers degradation	Structures Monitoring Program	No	The Metal Enclosed Bus Program, XI.E4, is credited for the aging management of elastomer seals associated with the MEB Enclosure Assemblies. The MEB Program performs internal inspections of the enclosure assembly for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of moisture intrusion which may indicate degradation of the elastomer seal.
3.6.1-11	High-voltage insulators	Degradation of insulation quality due to presence of any salt deposits and surface contamination; Loss of material caused by mechanical wear due to wind blowing on transmission conductors	Plant specific	Yes, plant specific	Consistent with NUREG-1801. The plant-specific High-Voltage Insulators in the 230KV Switchyard Program will be used to manage the applicable aging effects. This is discussed in Subsection 3.6.2.2.2.
3.6.1-12	Transmission conductors and connections; switchyard bus and connections	Loss of material due to wind induced abrasion and fatigue; loss of conductor strength due to corrosion; increased resistance of connection due to oxidation or loss of preload	Plant specific	Yes, plant specific	The aging effects specified in NUREG-1801 are negligible. As discussed in plant-specific Notes 606 and 607 of Table 3.6.2-1, no AMP is required. Further evaluation of this item is provided in Subsection 3.6.2.2.3.

TABLE 3.6.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VI OF NUREG-1801 FOR ELECTRICAL COMPONENTS

Item Number	Component/ Commodity	Aging Effect/Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.6.1-13	Cable Connections – Metallic parts	Loosening of bolted connections due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation	Electrical cable connections not subject to 10 CFR 50.49 environmental qualification requirements	No	Consistent with NUREG-1801.
3.6.1-14	Fuse Holders (Not Part of a Larger Assembly) Insulation material	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.

TABLE 3.6.2-1 ELECTRICAL AND I&C SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – ELECTRICAL/I&C COMPONENTS/COMMODITIES

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Electrical Equipment subject to 10 CFR 50.49 environmental qualification (EQ) requirements	Various	Various Polymeric and Metallic Materials	Adverse localized environment caused by heat, radiation, oxygen, moisture or voltage	Various degradation effects/ Various mechanisms	Environmental Qualification of Electric Equipment	VI.B-1 (L-05)	3.6.1-01	A
Cable Connections – Metallic Parts	E-1	Various Metals	Air - Indoor Air - Outdoor	Loosening of bolted connections due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	VI.A-1 (LP-12)	3.6.1-13	A
Non-EQ Insulated Cables and Connections	E-1	Various Organic Polymers (e.g., EPR, SR, EPDM, XLPE)	Adverse localized environment caused by heat, radiation, or moisture in the presence of oxygen	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure/ degradation of organics (Thermal/ thermoxidative), radiolysis and photolysis (UV sensitive materials only) of organics; radiation-induced oxidation, and moisture intrusion	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	VI.A-2 (L-01)	3.6.1-02	A

TABLE 3.6.2-1 (continued) ELECTRICAL AND I&C SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – ELECTRICAL/I&C COMPONENTS/COMMODITIES

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Non-EQ Cables and Connections Used in Instrumentation Circuits Sensitive to a Reduction in Insulation Resistance (IR)	E-1	Various Organic Polymers	Adverse localized environment caused by heat, radiation, or moisture in the presence of oxygen	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure/ degradation of organics (Thermal/ thermoxidative), radiolysis and photolysis (UV sensitive materials only) of organics; radiation-induced oxidation, and moisture intrusion	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	VI.A-3 (L-02)	3.6.1-03	A, 601
Medium-Voltage Power Cables	E-1	Various Organic Polymers	Adverse localized environment caused by exposure to moisture and voltage	Localized damage and breakdown of insulation leading to electrical failure/ moisture intrusion, water trees	Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	VI.A-4 (L-03)	3.6.1-04	A
Electrical connector contacts exposed to borated water leakage	E-1	Various Metals	Air with borated water leakage	Corrosion of connector contact surfaces/ intrusion of borated water	Boric Acid Corrosion	VI.A-5 (L-04)	3.6.1-05	A

TABLE 3.6.2-1 (continued) ELECTRICAL AND I&C SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – ELECTRICAL/I&C COMPONENTS/COMMODITIES

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fuse Holders (Not Part of a Larger Assembly); Insulation	E-2	Insulation Material-Melamine, Phenolic	Adverse localized environment caused by heat, radiation, or moisture in the presence of oxygen	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure/ degradation (Thermal/ thermoxidative), of organics/ thermoplastics, radiation-induced oxidation, moisture intrusion and ohmic heating	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	VI.A-6 (LP-03)	3.6.1-02	A, 602
			Air - Indoor	None	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	VI.A-7 (LP-02)	3.6.1-14	A, 602
Fuse Holders (Not Part of a Larger Assembly); Metallic Clamp	E-1	Copper Alloy	Air - Indoor	Loss of Continuity/ Corrosion, Oxidation	Fuse Holder	VI.A-8 (LP-01)	3.6.1-06	I, 603

TABLE 3.6.2-1 (continued) ELECTRICAL AND I&C SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – ELECTRICAL/I&C COMPONENTS/COMMODITIES

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Non-EQ Electrical/ I&C Penetration Assemblies	E-1	XLPO, SR, Kapton, EPDM, CSPE, EPR, Kynar (PVDF)	Adverse localized environment caused by heat, radiation, or moisture in the presence of oxygen	None	None			J, 604
Non-EQ Electrical/ I&C Penetration Assembly Pigtails	E-1	EPDM	Adverse localized environment caused by heat, radiation, or moisture in the presence of oxygen	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure/ degradation of organics (Thermal/ thermoxidative), radiolysis and photolysis (UV sensitive materials only) of organics; radiation-induced oxidation, and moisture intrusion	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements			J, 605
Metal Enclosed Bus-Bus/ Connections	E-1	Aluminum/ Silver Plated Aluminum, Copper, Steel	Air - Indoor Air - Outdoor	Loosening of bolted connections/thermal cycling and ohmic heating	Metal Enclosed Bus	VI.A-11 (LP-04)	3.6.1-07	A

TABLE 3.6.2-1 (continued) ELECTRICAL AND I&C SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – ELECTRICAL/I&C COMPONENTS/COMMODITIES

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Metal Enclosed Bus-Enclosure assemblies	E-2	Elastomers	Air - Indoor Air - Outdoor	Hardening and loss of strength/ elastomer degradation	Metal Enclosed Bus	VI.A-12 (LP-10)	3.6.1-10	E
Metal Enclosed Bus-Insulation/ insulators	E-2	Fiberglass, Organic Polymers, Phenolic, Porcelain	Air - Indoor Air - Outdoor	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure/ thermal/ thermoxidative degradation of organics/ thermoplastics, radiation-induced oxidation, moisture/ debris intrusion, and ohmic heating	Metal Enclosed Bus	VI.A-14 (LP-05)	3.6.1-08	A
High-Voltage Insulators	E-2	Cement, Galvanized Metals, Porcelain	Air - Outdoor	Degradation of insulation quality/presence of any salt deposits or surface contamination	High-Voltage Insulators in the 230KV Switchyard	VI.A-9 (LP-07)	3.6.1-11	A
				Loss of material/ mechanical wear due to wind blowing on transmission conductors	High-Voltage Insulators in the 230KV Switchyard	VI.A-10 (LP-11)	3.6.1-11	A

TABLE 3.6.2-1 (continued) ELECTRICAL AND I&C SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – ELECTRICAL/I&C COMPONENTS/COMMODITIES

Component/ Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Switchyard Bus and Connections	E-1	Aluminum, Galvanized Steel, Stainless Steel,	Air - Outdoor	None	None	VI.A-15 (LP-09)	3.6.1-12	I, 606
Transmission Conductors and Connections	E-1	Aluminum, Steel	Air - Outdoor	None	None	VI.A-16 (LP-08)	3.6.1-12	I, 607

Notes for Table 3.6.2-1:

Generic Notes:

A. Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B. Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C. Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D. Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E. Consistent with NUREG-1801 item for material, environment, and aging effect, but a different AMP is credited or NUREG-1801 identifies a plant-specific AMP.
F. Material not in NUREG-1801 for this component.
G. Environment not in NUREG-1801 for this component and material.
H. Aging effect not in NUREG-1801 for this component, material and environment combination.
I. Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J. Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant-specific Notes:

601. The scope of this program applies to the non-EQ cable systems in the Nuclear Instrumentation and Radiation Monitoring systems that are sensitive to a reduction in insulation resistance.

602. Evaluation has shown that the materials used for the fuse holder base (or block) experience no applicable aging effects in their service environment. Therefore, no aging management program is warranted for this item. However, since fuse holders represent another type of electrical connection similar to terminal blocks, fuse holders are included in the Electrical Cables and Connections Not Subject to 10 CFR 50.49 EQ Requirements Program .

603. CR-3 fuse holders subject to AMR are used in control valve and/or intermittent instrumentation and control (I&C) applications. The only fuses that could potentially be exposed to thermal cycling and ohmic heating are those that carry significant current in power supply applications. I&C circuits characteristically operate at such low currents that no appreciable thermal cycling or ohmic heating occurs. Since thermal cycling and ohmic heating apply to power supply applications, they are not considered applicable aging mechanisms for CR-3 fuse holders. CR-3 electrical design ensures that stresses due to forces associated with electrical faults and transients are mitigated by the fast action of circuit protective devices at high currents. Mechanical stress due to electrical faults is not considered a credible aging mechanism since such faults are infrequent and random in nature. CR-3 fuses are not routinely pulled and/or manipulated to facilitate plant testing. Therefore, frequent manipulation is not considered an applicable aging mechanism. Vibration is induced in fuse holders by the operation of external equipment, such as compressors, fans, and pumps. Plant walk-down has verified that there are no direct sources of vibration for the fuse holder panels, and the panels are mounted separately to their own unistrut support structure on a concrete wall or column. Therefore, vibration is not considered an applicable aging mechanism. Plant walk-down has verified that there are no potential sources of chemical contamination in the area and that the fuse holders are totally enclosed in a protective junction box which would provide protection even if chemical contamination were possible. Therefore, based on their installed location and design configuration, chemical contamination is not considered an applicable aging mechanism. Plant walk-down has verified that corrosion and oxidation are credible aging mechanisms for fuse holders located within the Auxiliary Building due to moisture. The moisture required to produce corrosion and oxidation is not present in other non-condensing areas of the plant. The Fuse Holder Aging Management Program will confirm the absence of corrosion and oxidation resulting from moisture on the metallic clamp. The scope of this program applies to fuse holders located in stand-alone junction boxes within the Auxiliary Building.

604. Evaluation has shown that the insulation materials for this commodity group are aptly suited for their service conditions and acceptable for the period of extended operation.

605. The Electrical Cables and Connections Not Subject To 10 CFR 50.49 EQ Requirements Program is applicable to non-EQ Namco conduit seal assembly pigtails.

606. Section 3.6 of NUREG-1800 indicates that further evaluation Switchyard Bus and Connections should be provided to address Loss of Material Due to Wind-Induced Abrasion and Fatigue, Loss of Conductor Strength Due to Corrosion, and Increased Resistance of Connection Due to Oxidation or Loss of Preload. Refer to the further evaluation of these aging effects in Subsection 3.6.2.2.3.

607. Section 3.6 of NUREG-1800 indicates that further evaluation Transmission Conductors and Connections should be provided to address Loss of Material Due to Wind-Induced Abrasion and Fatigue, Loss of Conductor Strength Due to Corrosion, and Increased Resistance of Connection Due to Oxidation or Loss of Preload. Refer to the further evaluation of these aging effects in Subsection 3.6.2.2.3.

[This page intentionally blank]

4.0 TIME-LIMITED AGING ANALYSES

Two areas of technical review are required to support an application for a renewed operating license. The first area of technical review is the Integrated Plant Assessment, described in Chapters 2.0 and 3.0. The second area of technical review is the identification and evaluation of plant-specific time-limited aging analyses and exemptions, provided in this chapter. The evaluations included in this chapter meet the requirements contained in10 CFR 54.21(c).

4.1 IDENTIFICATION OF TIME-LIMITED AGING ANALYSES

10 CFR 54.21(c) requires that an evaluation of time-limited aging analyses (TLAAs) be provided as part of the application for a renewed license. TLAAs are defined in 10 CFR 54.3 as those licensee calculations and analyses that:

1. Involve systems, structures, and components within the scope of license renewal, as delineated in 10 CFR 54.4(a);

2. Consider the effects of aging;

3. Involve time-limited assumptions defined by the current operating term, for example, 40 years;

4. Were determined to be relevant by the licensee in making a safety determination;

5. Involve conclusions or provide the basis for conclusions related to the capability of the system, structure, and component to perform its intended functions, as delineated in 10 CFR 54.4(b); and

6. Are contained or incorporated by reference in the current licensing basis.

4.1.1 TIME-LIMITED AGING ANALYSES IDENTIFICATION PROCESS

The process used to identify the CR-3-specific TLAAs is consistent with the guidance provided in NEI 95-10, "Industry Guidelines for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule." Calculations and evaluations that could potentially meet the six criteria of 10 CFR 54.3 were identified by searching CLB and other documents including:

- Technical Specifications,
- The CR-3 FSAR,
- Docketed licensing correspondence,
- Design Basis Documents,
- CR-3 calculations, and
- Applicable AREVA analyses and reports.

Industry- and NRC-prepared documents that list generic TLAAs also were reviewed to provide additional assurance of the completeness of the plant-specific list. These documents included NEI 95-10; NUREG-1800, "Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants," Rev. 1, U. S. Nuclear Regulatory Commission, September 2005, NUREG-1801, "Generic Aging Lessons Learned (GALL) Report;" Rev. 1, U. S. Nuclear Regulatory Commission, September 2005, and License Renewal Applications submitted by other PWR licensees.

The potential TLAAs were evaluated by screening against the six criteria in the definition of TLAA in 10 CFR 54.3. The analyses and evaluations that meet all six criteria of 10 CFR 54.3 are the TLAAs for CR-3 and are listed in Table 4.1-1.

Table 4.1-2 summarizes the results of reviewing the generic list of TLAAs provided in Tables 4.1-2 and 4.1-3 of NUREG-1800.

4.1.2 EVALUATION OF TIME-LIMITED AGING ANALYSES

As required by10 CFR 54.21(c)(1), an evaluation of CR-3-specific TLAAs must be performed to demonstrate that:

(i) The analyses remain valid for the period of extended operation;

(ii) The analyses have been projected to the end of the period of extended operation; or

(iii) The effects of aging on the intended functions(s) will be adequately managed for the period of extended operation.

The results of these evaluations are summarized in Table 4.1-1 and discussed in Sections 4.2 through 4.7.

4.1.3 IDENTIFICATION OF EXEMPTIONS

10 CFR 54.21(c) also requires that the application for a renewed license include a list of plant-specific exemptions granted pursuant to 10 CFR 50.12 and in effect that are based on TLAAs as defined in 10 CFR 54.3. This was performed by evaluating the basis for each active exemption, granted pursuant to 10 CFR 50.12, to determine whether the exemption was based on a TLAA.

As a result of this review, one exemption was identified as meeting the definition of a TLAA. This is a partial exemption from the provisions to 10 CFR 50, Appendix A, General Design Criterion 4, to permit revision of the design of reactor coolant pump supports. Specifically the exemption permitted replacing 32 large bore piping snubbers with four smaller snubbers and four struts. The analysis used leak-before-break (LBB) technology that relies on fracture mechanics to demonstrate the capability to detect leakage well before any cracks in the pipe wall could become unstable and grow to failure. The fracture mechanics analysis is contained in report BAW-1847, "The B&W Owner's Group Leak-Before-Break Evaluation of Margins Against Full Break for RCS Primary Piping of B&W Designed NSSS," Revision 1. This evaluation is a TLAA for CR-3 and is listed on Table 4.1-1.

TABLE 4.1-1 TIME-LIMITED AGING ANALYSES

NUREG-1800 TLAA Category	Analysis	10 CFR 54.21(c)(1) Paragraph	Section
1.	**Reactor Vessel Neutron Embrittlement**	----------	4.2
	Neutron Fluence	(ii)	4.2.1
	Upper Shelf Energy Analysis	(ii)	4.2.2
	Pressurized Thermal Shock Analysis	(ii)	4.2.3
	Operating Pressure-Temperature Limits Analysis	(iii)	4.2.4
	Low Temperature Overpressure Limits Analysis	(iii)	4.2.5
	Reactor Vessel Underclad Cracking	(ii)	4.2.6
	Reduction in Fracture Toughness of Reactor Vessel Internals	(iii)	4.2.7
2.	**Metal Fatigue**	----------	4.3
	Fatigue Analyses (NSSS Components)	----------	4.3.1
	Reactor Vessel	(iii)	4.3.1.1
	Reactor Vessel Internals	(ii) and (iii)	4.3.1.2
	Control Rod Drive Mechanism	(i)	4.3.1.3
	Reactor Coolant Pumps	(i) and (ii)	4.3.1.4
	Steam Generators	(iii)	4.3.1.5
	Pressurizer	(iii)	4.3.1.6
	Reactor Coolant Pressure Boundary Piping (USAS B31.7)	(iii)	4.3.1.7
	Implicit Fatigue Analysis (B31.1 Piping)	----------	4.3.2
	USAS B31.1.0 Piping - RCPB Class 1	(i) and (iii)	4.3.2.1
	USAS B31.1.0 Piping - Non-Class 1	(i) and (ii)	4.3.2.2
	Environmentally-Assisted Fatigue Analysis	(iii)	4.3.3
	RCS Loop Piping Leak-Before-Break Analysis	(i)	4.3.4
3.	**Environmental Qualification of Electrical Equipment**	----------	4.4
	10 CFR 50.49 Thermal, Radiation, and Cyclical Aging Analyses	(iii)	4.4.1
4.	**Concrete Containment Tendon Prestress**	----------	4.5
	Tendon Stress Relaxation Analysis	(ii)	4.5.1
5.	**Containment Liner Plate, Metal Containments, and Penetrations Fatigue Analysis**	----------	4.6
	Fuel Transfer Tube Expansion Bellows Cycles	(i)	4.6.1
6.	**Other Plant-Specific Time-Limited Aging Analyses**	----------	4.7
	Analysis of Bedrock Dissolution from Groundwater	(ii)	4.7.1

TABLE 4.1-2 REVIEW OF GENERIC TLAAs LISTED ON TABLES 4.1-2 AND 4.1-3 OF NUREG-1800

NUREG-1800 Generic TLAA Examples	Applicability to CR-3	Section
NUREG-1800, Table 4.1-2		
Reactor vessel neutron embrittlement	Yes	4.2
Concrete containment tendon prestress	Yes	4.5
Metal fatigue	Yes	4.3
Environmental qualification of electrical equipment	Yes	4.4
Metal corrosion allowance	No - No potential TLAA identified.	-
Inservice flaw growth analyses that demonstrate structure stability for 40 years	No - No potential TLAA identified.	-
Inservice local metal containment corrosion analyses	No - Did not meet TLAA criteria.	-
High-energy line-break postulation based on fatigue cumulative usage factor	No - Did not meet TLAA criteria.	-
NUREG-1800, Table 4.1-3		
Intergranular separation in the heat-affected zone (HAZ) of reactor vessel low-alloy steel under austenitic SS cladding.	Yes	4.2.6
Low-temperature overpressure protection (LTOP) analyses	Yes	4.2.5
Fatigue analysis for the main steam supply lines to the turbine driven auxiliary feedwater pumps	Yes	4.3.2.2
Fatigue analysis for the reactor coolant pump flywheel	No - Did not meet TLAA criteria.	-
Fatigue analysis of polar crane	No - Did not meet TLAA criteria.	-
Flow-induced vibration endurance limit for the reactor vessel internals	Yes	4.3.1.2
Transient cycle count assumptions for the reactor vessel internals	Yes	4.3.1.2
Ductility reduction of fracture toughness for the reactor vessel internals	Yes	4.2.7
Leak before break	Yes	4.3.4
Fatigue analysis for the containment liner plate	No - Did not meet TLAA criteria.	-
Containment penetration pressurization cycles	No - No potential TLAA identified.	-
Reactor vessel circumferential weld inspection relief (BWR)	Not applicable.	-

4.2 REACTOR VESSEL NEUTRON EMBRITTLEMENT

Neutron embrittlement is the term used to describe changes in mechanical properties of reactor vessel (RV) materials that result from exposure to fast neutron flux (E > 1.0 MeV) within the vicinity of the reactor core, called the beltline region. The most pronounced material change is a reduction in fracture toughness. As fracture toughness decreases with cumulative fast neutron exposure, the material's resistance to crack propagation decreases. The rate of neutron exposure is defined as neutron flux, and the cumulative degree of exposure over time is defined as neutron fluence.

Fracture toughness of ferritic materials is not only dependent upon fluence, but is also dependent upon temperature. The reference temperature for nil-ductility transition, RT_{NDT}, is an indicator of the transition temperature range above which the material behaves in a ductile manner, and below which it behaves in a brittle manner. As fluence increases, the nil-ductility reference temperature increases. This means higher temperatures are required for the material to continue to behave in a ductile manner. This shift in reference temperature is the ΔRT_{NDT} plus a margin term which is added to account for uncertainties associated with the limited amount of data available for making the projections. Determining the projected reduction in fracture toughness as a function of fluence affects several analyses used to support operation of CR-3:

- Reactor Pressure Vessel (RPV) Fluence
- RPV Material Upper-Shelf Energy (USE)
- RPV Pressurized Thermal Shock (PTS)
- RPV Operating Pressure-Temperature (P-T) Limits
- RPV Low-Temperature Overpressure Protection (LTOP) Setpoints
- Reactor Vessel Underclad Cracking
- Reduction in Fracture Toughness of Reactor Vessel Internals

Since extending the operating period from 40 years to 60 years will further increase the fluence levels, the 60-year fluence value must be determined and used to determine its impact upon the analyses used to support operation. The approach taken was that, if the existing analyses could not be demonstrated to remain valid, new analyses were prepared. If a revised analysis was not feasible, the aging effect identified within the time-limited aging analysis (TLAA) will be managed during the period of extended operation.

4.2.1 NEUTRON FLUENCE

Summary Description

Loss of fracture toughness is an aging effect caused by the neutron embrittlement aging mechanism that results from prolonged exposure to neutron irradiation. This process results in increased tensile strength and hardness of the material with reduced toughness. The rate of neutron exposure is defined as neutron flux, and the cumulative degree of exposure over time is defined as neutron fluence. As neutron embrittlement progresses, the toughness/temperature curve shifts down (lower fracture toughness), and the curve shifts to the right (brittle/ductile transition temperature increases). NRC regulations require projections to be made showing the degree of shift expected using end-of-life (EOL) fluence values. A minimum upper shelf energy (USE) value limits the degree of downward shift, and a pressurized thermal shock (PTS) screening criteria (maximum reference temperature) limits the shifting of the ductile/brittle transition temperature to the right. If a projection indicates a shift exceeding these limits could occur in the future, changes must be implemented to either prevent this from occurring, such as improved operational practices, fluence reduction strategies, or additional evaluations must demonstrate that equivalent margins of safety exist even with the projected shift.

End-of-life fluence is based on a projected value of effective full power years (EFPY) over the licensed life of the plant. For the current term of operation, end-of-life for CR-3 is 40 years and reactor vessel embrittlement calculations for pressurized thermal shock and upper shelf energy are based on fluence projections at 32 EFPY. The plant began operation in December 1976, and the plant lifetime capacity factor through 2005 is 68.2%. Assuming a plant capacity factor of 98.5% beyond 2005, CR-3 will accrue approximately 50.3 EFPY by December 2036. Therefore, a 54 EFPY fluence estimate used for calculating reactor vessel embrittlement for 60 years of operation is bounding for the period of extended operation.

Analysis

AREVA NP (previously Framatome) developed a fluence analysis methodology that can be used to accurately predict the fast neutron fluence in the reactor vessel using surveillance capsule dosimetry and/or cavity dosimetry to verify the fluence predictions. This methodology was developed through a full-scale benchmark experiment that was performed at the Davis-Besse Unit 1 reactor. The benchmark experiment demonstrated that the AREVA NP methodology was unbiased and was accurate well within the NRC suggested standard deviation of 20%. The AREVA NP fluence analysis methodology is compliant with NRC Regulatory Guide (RG) 1.190, as described in topical report BAW-2241NP-A, Revision 1, "Fluence and Uncertainty Methodologies," December 1999.

The NRC reviewed the AREVA NP methodology and concluded that the proposed methodology is acceptable for determining the pressure vessel fluence of B&W designed reactors. The NRC determined that the AREVA NP methodology could be referenced in B&W designed reactor licensing actions with three limitations. The applicability of those limitations to CR-3 license renewal are discussed below:

1. The dosimetry calculation-to-measurement database includes an extensive set of PWR core/internals/vessel configurations. However, the dosimetry set is not complete and certain designs are not included in the data-base. CR-3 is a B&W-designed reactor, and all applicable dosimetry is included in the database reported in BAW-2241NP-A, Revision 1.
2. Should there be changes in the input cross section of this methodology the licensee will evaluate the changes for their impact and if necessary will modify the methodology accordingly. (There have been no changes to the cross section methodology.)
3. The licensee will provide the staff with a record of future modifications of the methodology. (Note that there have been no changes to the methodology.)

The AREVA NP methodology was used to calculate the neutron fluence exposure to the CR-3 reactor vessel. The fast neutron fluence (neutron energy (E) > 1.0 MeV) at the reactor vessel upper and lower plates, as well as specific welds, was calculated in accordance with the requirements of RG 1.190.

The 54 EFPY fluence values include ex-vessel cavity dosimetry data from Cycles 11 and 12 and plant operation through Cycle 14. To account for a measurement uncertainty recapture, the Cycle 14 fluxes were used for Cycle 15 and increased by a factor of 1.02 for Cycles 16 and 17. The Cycle 16 and 17 flux was increased by a factor of 1.25 for Cycle 18 through the period of extended operation. The 54 EFPY fluence projections at the reactor vessel inside wetted surface are presented in Table 4.2-1.

Reactor Vessel Beltline

Reactor pressure vessel boundary components outside the beltline region have been evaluated to determine whether additional materials should be considered "beltline" material for the period of extended operation. The beltline, as defined by 10 CFR 50.61(a)(3), is the region of the reactor pressure vessel that directly surrounds the effective height of the active core and adjacent regions of the reactor pressure vessel that are predicted to experience sufficient neutron radiation damage to be considered in the selection for the most limiting material with regard to radiation damage. The threshold fluence for potential beltline material is 1.0E+17 n/cm^2, E > 1.0 MeV. The beltline materials for CR-3 for 60 years (i.e., 54 EFPY) include items 2 through 12 in Table 4.2-1. Items 1 and 13 are not considered beltline material since the fluence is less than the threshold fluence specified in 10 CFR 50, Appendix H.

Reactor Vessel Surveillance Program

The limiting beltline circumferential weld based on fluence and RT_{PTS}, as discussed in Subsection 4.2.3, for CR-3 at 54 EFPY is WF-70, heat number 72105. As indicated on Table 4.2-1, the fluence at 54 EFPY for weld WF-70, is 1.56E+19 n/cm^2. In the Master Integrated Reactor Vessel Material Surveillance Program (MIRVP), two capsules with weld wire heat number 72105 have been irradiated to fluence values equal to or greater than 1.56E+19 n/cm^2 and tested. Therefore, the MIRVP program covers the fluence at 54 EFPY for CR-3 weld WF-70, and no additional surveillance material or testing is required for 60 years of operation.

The limiting beltline axial weld based on fluence and RT_{PTS} for CR-3 at 54 EFPY is WF-8, heat number 8T1762. This heat of material is not in the MIRVP, and there is no need to add this material since the CR-3 Linde 80 beltline weld materials, including WF-8, are adequately represented by the eight heats of material in the MIRVP program.

The limiting shell plate material for CR-3 is C4344-1, which was included in CR-3-specific capsules, and all specimens have been removed and tested. As indicated on Table 4.2-1, the 54 EFPY fluence at plate C4344-1 is predicted to be 1.60E+19 n/cm^2. Capsule CR3-F, which contained C4344-1 material, received a fluence of 1.08E+19 n/cm^2 and was removed and tested. The MIRVP has determined that no further testing is required for material C4344-1 since the plate material is not the limiting material for the CR-3 vessel and the MIRVP meets the requirements of 10 CFR 50, Appendix H. For further information on the CR-3 Reactor Vessel Surveillance Program see Appendix B, Subsection B.2.17.

Therefore, the neutron fluence has been projected to the end of the period of extended operation using a methodology previously approved by the NRC. These fluence projections will be used for evaluating fluence-based TLAAs for CR-3 License Renewal.

Disposition: 10 CFR 54.21(c)(1)(ii) – The neutron fluence analyses have been projected to the end of the period of extended operation.

4.2.2 UPPER SHELF ENERGY ANALYSIS

Summary Description

Fracture toughness is a property which describes the ability of a material to resist fracture. In reactor vessel ferritic materials, toughness increases as a function of temperature. At low temperatures, material toughness is relatively low and changes very little with temperature, and the material is said to exhibit brittle behavior. As the temperature increases, a transition region is eventually reached in which toughness increases rapidly with an increase in temperature. At temperatures above the transition region, the material toughness is relatively high and changes very little with temperature, and the material is said to exhibit ductile behavior. The Charpy impact test is used to estimate fracture toughness by measuring the amount of energy absorbed during the fracture of a notched test specimen. Upper-shelf energy (USE) is a measure of the average energy absorbed by Charpy impact specimens tested at a temperature above the upper end of the transition region. 10 CFR 50, Appendix G, states that reactor vessel beltline materials must have Charpy upper-shelf energy (C_VUSE) in the transverse direction for base metal and along the weld for weld metal of no less than 75 ft-lb in the unirradiated condition, and must maintain C_VUSE of no less than 50 ft-lb throughout the licensed life of the vessel, unless it can be demonstrated that lower values of energy will provide margins of safety against fracture equivalent to those required by the ASME Code, Section XI, Appendix G.

NRC RG 1.99, Revision 2, "Radiation Embrittlement of Reactor Vessel Materials," provides two methods for determining C_VUSE. Position 1.2 applies for material that does not have surveillance data available, and Position 2.2 applies for material that does have surveillance data. For Position 1.2, the percent drop in C_VUSE, for a stated copper content and neutron fluence, is determined by reference to Figure 2 of RG 1.99, Revision 2. This percentage drop is applied to the initial C_VUSE to obtain the adjusted C_VUSE. For Position 2.2, the percent drop in C_VUSE is determined by plotting the available data on Figure 2, and fitting the data with a line drawn parallel to the existing lines that represent upper bounds of all the plotted points.

Analysis

<u>USE for Beltline Plates and Forgings</u>

Initial upper shelf energy and copper content for beltline plates and forgings are listed in Table 4.2-2. Fluence at the 1/4T location is based on attenuation of the inside wetted surface fluences presented in Table 4.2-1 using RG 1.99, Revision 2, Equation (3) with a base metal thickness of 8.44 in. and cladding thickness of 0.125 in. Upper shelf energies for these beltline plates and forgings at 54 EFPY, using Position 1.2, are reported in Table 4.2-2 and are all above 50 ft-lb, which is acceptable. Percentage reduction in USE is obtained from Figure 2 of Regulatory Guide 1.99, Revision 2. Position 2.2 could be applied to plate C4344-1, but Position 1.2 is bounding.

<u>USE for Beltline Welds</u>

As is the case for the current term of operation, the C_VUSE values for all beltline welds are below 50 ft-lb, requiring an equivalent margin analysis (EMA) for the period of extended operation. The methodology used to evaluate CR-3 beltline welds at 60 years is consistent with the EMA methods reported in BAW-2192PA, "Low Upper-Shelf Toughness Fracture Mechanics Analysis of Reactor Vessels of B&W Owners Reactor Vessel Working Group for Level A & B Service Loads," April 1994; BAW-2178PA, "Low Upper-Shelf Toughness Fracture Mechanics Analysis of Reactor Vessels of B&W Owners Reactor Vessel Working Group for Level C & D Service Loads," April 1994; and BAW-2275A, "Low Upper Shelf Toughness Fracture Mechanics Analysis of B&W

Designed Reactor Vessels for 48 EFPY," August 1999. BAW-2275A comprises Appendix B of BAW-2251A, "Demonstration of Management of Aging Effects for the Reactor Vessel," January 2002.

An updated EMA was performed on CR-3 limiting beltline welds WF-70, WF-8, and WF-18 to consider the effect of increased fluence on the J-integral, which is a function of fluence. The applied J-integral, which is due to loading, is not a function of fluence and remains unchanged from earlier analyses. The results of the updated analysis are provided in Table 4.2-3 and Table 4.2-4.

The results in Table 4.2-3 show that the first acceptance criterion of $J_{0.1} / J_1 > 1.0$ from ASME Section XI, Article K-2200(a)(1) for Level A and B service loading is met. The results in Table 4.2-4 show that the acceptance criterion of $J_{0.1} / J_1 > 1.0$ for Level C and D service loading is also met.

Therefore, the limiting CR-3 welds provide margins of safety equivalent to those of Appendix G of the Section XI of the ASME Code and have adequate upper-shelf toughness, and satisfy the requirements of Appendix G to 10 CFR 50 for operation through 54 EFPY.

USE Summary for Beltline Plates, Forgings, and Welds

An evaluation of the USE for the CR-3 RPV beltline materials was performed for the 54-EFPY License Renewal period using the guidelines in RG 1.99, Revision 2. The evaluations for the decreases in USE of the RPV were performed at the 1/4T wall location of each beltline material using the respective copper contents and Figure 2 of RG 1.99, Revision 2. The results of the evaluations are provided in Table 4.2-2. All shell plate and forgings remain above the 50 ft-lb limit. However, all the CR-3 RPV beltline welds have projected USE less than 50 ft-lb, and equivalent margins analyses have been performed to show the acceptability of these welds to the end of the 60-year period of extended operation. The results of these evaluations are shown in Table 4.2-3 and Table 4.2-4.

Disposition: 10 CFR 54.21(c)(1)(ii) – The analysis of Upper Shelf Energy has been projected to the end of the period of extended operation.

4.2.3 PRESSURIZED THERMAL SHOCK ANALYSIS

Summary Description

10 CFR 50.61 defines screening criteria for embrittlement of reactor pressure vessel materials in pressurized-water reactors, as well as actions that are required if these screening criteria are exceeded. The screening criteria limit the degree that a vessel material may increase in its reference temperature for pressurized thermal shock - RT_{PTS}, following neutron irradiation of the reactor pressure vessel. For circumferential

welds, the pressurized thermal shock (PTS) screening criterion is 300°F maximum. For plates, forgings, and axial weld materials, the screening criterion is 270°F maximum. The projected EOL RT_{PTS} values must be shown to remain below the applicable screening temperature.

Analysis

A PTS evaluation for the CR-3 RV beltline materials was performed in accordance with 10 CFR 50.61. The PTS reference temperature, RT_{PTS}, values are calculated by adding the initial RT_{NDT} to the predicted radiation-induced ΔRT_{NDT} and the margin term to cover the uncertainties in the values of initial RT_{NDT} copper and nickel contents, fluence, and the calculational procedures. The predicted radiation induced ΔRT_{NDT} is calculated using the respective RV beltline materials copper and nickel contents and the neutron fluence applicable to the CR-3 RV for License Renewal at 54 EFPY.

The evaluations for the CR-3 RT_{PTS} values were performed for each CR-3 reactor vessel beltline material with chemistry factors determined from Tables 1 and 2 in 10 CFR 50.61. In addition, the chemistry factors for the upper shell plate, heat number C4344-1 was recalculated using the available CR-3 surveillance data in accordance with RG 1.99, Revision 2.

The CR-3 RT_{PTS} values for the reactor vessel beltline materials for the period of extended operation are found in Table 4.2-5, calculated using 54 EFPY inside wetted surface fluence projections. The limiting longitudinal welds are WF-8 and WF-18 with an RT_{PTS} of 231.3°F, which is below the screening criterion of 270ºF. The limiting circumferential weld is WF-70 with an RT_{PTS} of 253.8°F, which is below the screening criterion of 300°F.

Disposition: **10 CFR 54.21(c)(1)(ii) – The analyses for the shift in PTS reference temperature have been projected to the end of the period of extended operation.**

4.2.4 OPERATING PRESSURE-TEMPERATURE LIMITS ANALYSIS

Summary Description

The adjusted reference temperature (ART) is the value of Initial RT_{NDT} + ΔRT_{NDT} + margins for uncertainties at a specific reactor vessel location. Neutron embrittlement increases the ART. Thus, the minimum temperature at which a reactor vessel is allowed to be pressurized increases over the licensed period. The ART of the limiting beltline material is used to adjust the beltline pressure-temperature (P-T) limits to account for radiation effects. 10 CFR Part 50, Appendix G requires reactor vessel thermal limit analyses to determine operating P-T limits for boltup, hydrotest, pressure tests, normal operation, and anticipated operational occurrences. Operating limits for pressure and temperature are required for three categories of operation: 1) hydrostatic pressure tests and leak tests, 2) non-nuclear heat-up/cooldown and low level physics tests, and 3) core critical operation.

10 CFR 50, Appendix G, provides P-T limits and minimum temperature requirements for the reactor vessel. The P-T limits and minimum temperature requirements are defined by operating condition, vessel pressure, whether or not fuel is in the vessel, and whether the core is critical. The P-T limits must be at least as restrictive as limits obtained by following the methods of analysis and margins of safety of Appendix G of Section XI of the ASME Code.

The P-T limits are established by calculations that utilize the materials and fluence data obtained through the reactor surveillance capsule program. Normally, the P-T limits are calculated for several years into the future and remain valid for an established period of time.

Analysis

The ART values for the CR-3 reactor vessel beltline region materials are calculated in accordance with RG 1.99, Revision 2, by adding the initial RT_{NDT} to the predicted radiation-induced ΔRT_{NDT}, and a margin term to cover the uncertainties in the values of initial RT_{NDT}, copper and nickel contents, fluence, and the calculational procedures. The predicted radiation induced ΔRT_{NDT} is calculated using the respective reactor vessel beltline materials copper and nickel contents and the neutron fluence applicable to 54 EFPY. The evaluations for the CR-3 ART were performed at the 1/4T and 3/4T wall location of each beltline material with chemistry factors determined from Tables 1 and 2 in RG 1.99, Revision 2. In addition, the chemistry factors for the Upper Shell Plate, heat number C4344-1, were recalculated using the available CR-3 surveillance data.

In this manner, ART results for the CR-3 reactor vessel beltline region materials applicable to 54 EFPY were determined, and are presented in Table 4.2-6. Based on the results in Table 4.2-6, the controlling beltline material for the CR-3 reactor vessel with respect to P-T limits are the Upper Shell Circumferential Weld (Inside 40%) SA-1769 (at 1/4T) and the Upper/Lower Shell Circumferential Weld WF-70 (at 3/4T).

The pressure-temperature operating limits were developed in accordance with the requirements of 10 CFR Part 50, Appendix G, utilizing the analytical methods and flaw acceptance criteria of topical report BAW-10046A, "Methods of Compliance with Fracture Toughness and Operational Requirements of 10 CFR 50, Appendix G," Revision 2, June 1996, and ASME Code Section XI, Appendix G, 2001 edition through 2003 Addenda. CR-3 has implemented changes in the P-T limit curves throughout the current period of operation. ASME Code Cases N-588 and N-640 are incorporated in ASME Section XI, Appendix G, 2001 edition through 2003 Addenda. With the incorporation of the new methodology from ASME Code Section XI, Appendix G, 2001 edition through 2003 Addenda, and the improved replacement RV head, the 54 EFPY uncorrected P-T limits provide more operating room than the 32 EFPY uncorrected P-T curves.

CR-3 Technical Specifications refer to the P-T limit curves in the Pressure-Temperature Limits Report (PTLR), and those P-T limit curves are valid through 32 EFPY. Although new P-T limits for CR-3 for the period of extended operation have been calculated, it is not intended to implement these new curves at this time. CR-3 will continue to implement changes in the P-T limit curves in the PTLR, as required by Appendix G of 10 CFR part 50, for the remainder of the current period of operation and for the extended period of operation. The P-T limits for the remainder of the current period of operation and for the extended period of operation will be managed by using approved fluence calculations when there are changes in power or core design, and with surveillance capsule results. Updating the P-T limit curves using the described approach will assure that the operational limits remain valid for the remainder of the current period of operation and for the extended period of operation. Maintaining the P-T limit curves in accordance with Appendix G of 10 CFR 50 assures 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)(iii).

Disposition: 10 CFR 54.21(c)(1)(iii) – The P-T limits analysis will be managed through the end of the period of extended operation.

4.2.5 LOW-TEMPERATURE OVERPRESSURE LIMITS ANALYSIS

Summary Description

ASME Section XI, Appendix G, establishes procedures and limits for RCS pressure and temperature primarily for low temperature conditions to provide protection against non-ductile failure of the RV. The Low Temperature Overpressure Protection System (LTOPS) assures that these limits are not exceeded when it is enabled at low temperatures.

Analysis

The LTOP setpoints for CR-3 have been reanalyzed to support operation to the end of the period of extended operation. The LTOP setpoint analysis included the fluence projections from Subsection 4.2.1 and available surveillance data. The revised LTOP setpoints will be implemented when the revised P-T limit curves are implemented, prior to exceeding 32 EFPY. Maintaining the LTOP setpoints in accordance with Appendix G of 10 CFR 50 and 10 CFR 50.60 assures 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)(iii).

Disposition: 10 CFR 54.21(c)(1)(iii) – The LTOP setpoints will be managed through the end of the period of extended operation.

4.2.6 REACTOR VESSEL UNDERCLAD CRACKING

Summary Description

Underclad cracking (UCC) refers to intergranular separations in the heat affected zones of low alloy base metal under austenitic stainless steel cladding. B&W conducted an intensive investigation of UCC in the 1970s, consisting of testing and analysis. Results of the investigation showed the subject flaws are present only in A-508, Class 2, forgings manufactured to a coarse grain practice and clad by high-heat-input submerged arc process such as the six-wire, strip, and the two-wire series arc. The investigations also noted that no anomalies were observed in SA-533 Grade B, Class 1 plate materials clad by any of the high-heat-input processes.

The maximum discontinuity depth observed throughout the industry (0.156 in.) was used in the fracture mechanics analysis summarized in BAW-10013-A, "Study of Intergranular Separations in Low-Alloy Steel Heat-Affected Zones under Austenitic Stainless Steel Weld Cladding," October, 1972. The results of the fracture mechanics analysis demonstrated that the critical crack size required to initiate fast fracture is several orders of magnitude greater than the assumed maximum flaw size plus predicted growth due to design fatigue cycles.

Analysis

The fracture mechanics analysis for underclad cracking was updated in BAW-2274A, "Fracture Mechanics Analysis of Postulated Underclad Cracks in B&W Designed Reactor Vessels for the Period of Extended Operation," August 1999, to include the period of extended operation. The revised analysis concluded that postulated underclad cracking in the RVI meets the acceptance criteria of the ASME Code, Section XI, IWB-3612. The maximum crack growth and applied stress intensity factor for normal and upset conditions occur in the nozzle belt region. The fracture toughness margin for normal and upset conditions was determined to be 3.63, which is greater than the required toughness margin of 3.16. The maximum applied stress intensity for the emergency and faulted condition occurs in the closure head to head flange regions. The fracture toughness margin for emergency and faulted condition was 2.42, which is greater than the required toughness margin of 1.41.

The revised analysis was based on fracture toughness properties associated with 60-year fluences and was intended to bound the B&W fleet. While CR-3 is not specifically listed as a participant in BAW-2274A, the generic evaluation used bounding loads from the entire fleet of B&W 177 FA lowered loop operating plants. The loads used in the analysis are bounding for CR-3, provided that the material properties of applicable CR-3 vessel are bounded by those presented in BAW-2274A. Three vessel regions were evaluated: (1) nozzle belt, (2) closure flange, and (3) beltline.

Nozzle Belt

The ART at the inside surface of CR-3 Lower Nozzle Belt Forging AZJ 94 is 3.0°F higher than the ART evaluated for the previously limiting forging. Therefore, the CR-3 nozzle belt forging is not bounded and was re-analyzed for 54 EFPY. The results show that the postulated 0.353 in.-deep flaw on the inside surface of the CR-3 Lower Nozzle Belt Forging satisfies the IWB-3612 acceptance criteria for fracture toughness margin. Considering 54 EFPY of fatigue crack growth, the final flaw size is 0.487 in., and the fracture toughness margin of 3.49 for Level A and B Service Loadings is greater than the required value of 3.16. The available fracture toughness margin for Level C and D Service Loadings is 2.50 which exceeds the required value of 1.41. The results demonstrate that a postulated underclad crack in the CR-3 Lower Nozzle Belt Forging would satisfy the flaw acceptance criteria of the ASME Code for 54 EFPY of operation over a period of 60 years.

Closure Flange

Evaluation of the closure flange in BAW-2274A identified limiting closure flange material based on an inside surface fluence of 7.78E+16 n/cm^2. For CR-3, the fluence at 54 EFPY at the closure flange is 4.38E+13 n/cm^2 (Refer to Item 1 of Table 4.2-1) and thus remains bounded.

Beltline (Upper and Lower Shells)

CR-3 beltline upper and lower shell plates are fabricated from SA-533 Grade B, Class 1 and are not susceptible to underclad cracking. Since CR-3 does not have A-508, Class 2 forgings in the upper and lower shell region, the increase in ART due to increased fluence at 54 EFPY is not relevant for the evaluation of underclad cracking.

Disposition: 10 CFR 54.21(c)(1)(ii) – The underclad cracking analysis has been projected through the period of extended operation.

4.2.7 REDUCTION IN FRACTURE TOUGHNESS OF REACTOR VESSEL INTERNALS

Summary Description

Reduction of fracture toughness of reactor vessel internals is an aging effect caused by exposure to neutron irradiation. Prolonged exposure to high-energy neutrons results in changes to the mechanical properties, such as an increase in tensile and yield strength, and decreases in ductility and fracture toughness. The extent of loss of fracture toughness is a function of both the irradiation temperature and neutron fluence. The reactor vessel internals components most susceptible to reduction in fracture toughness are those nearest to the reactor core.

The effect of irradiation on the mechanical properties and deformation limits for the reactor vessel internals was evaluated for the current term of operation in Appendix E of topical report BAW-10008, Part 1, Revision 1, "Reactor Internals Stress and Deflection Due to Loss-of-Coolant Accident and Maximum Hypothetical Earthquake," June, 1970. The analysis concluded that the reactor internals will have adequate ductility to absorb local strain at the regions of maximum stress intensity, and that irradiation will not adversely affect deformation limits. This analysis is a TLAA for the current term of operation.

Analysis

In accordance with the guidance of NUREG-1801, Revision 1, regarding the aging management of reactor vessel internals components, CR-3 will:

1. Participate in the industry programs for investigating and managing aging effects on reactor internals,

2. Evaluate and implement the results of the industry programs as applicable to the reactor internals, and

3. Upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor vessel internals to the NRC for review and approval.

This CR-3 commitment is documented in the FSAR supplement.

Disposition: **10 CFR 54.21(c)(1)(iii) – Reduction in fracture toughness of reactor vessel internals will be managed, consistent with the commitment to participate in industry programs related to the reactor vessel internals, through the end of the period of extended operation.**

TABLE 4.2-1 PROJECTED 60-YEAR (54 EFPY) FLUENCE VALUES

Reactor Vessel Location (At inside wetted surface)	Material ID	Fluence (n/cm^2)
Plates & Forgings		
1. Nozzle Belt Closure Flange (Note 1)	Not applicable	4.38E+13
2. Nozzle Belt Forging - Lower	AZJ 94	1.48E+19
3. Upper Shell Plate	C4344-1	1.60E+19
4. Upper Shell Plate	C4344-2	1.60E+19
5. Lower Shell Plate	C4347-1	1.62E+19
6. Lower Shell Plate	C4347-2	1.62E+19
Welds		
7. Upper Shell Circumferential (Circ.) Weld (Inside 40%)	SA-1769	1.48E+19
8. Upper Shell Circ. Weld (Outside 60%)	WF-169-1	(Note 2)
9. Upper Shell Axial Weld	WF-8	1.44E+19
10. Upper Shell Axial Weld	WF-18	1.44E+19
11. Upper Shell to Lower Shell Circ. Weld	WF-70	1.56E+19
12. Lower Shell Axial Welds	SA-1580	1.35E+19
13. Lower Nozzle Belt Forging to Outlet Nozzle Forging Weld (Note 1)	WF-70	6.67E+16

Notes:

1. Items 1 and 13 are not considered beltline material since the fluence is less than the threshold fluence specified in 10 CFR 50, Appendix H.
2. The Upper Shell Circumferential Weld (Outside 60%) does not contact the inside surface of the reactor vessel; therefore, inside wetted surface fluence is not applicable.

TABLE 4.2-2 PROJECTED 54 EFPY CHARPY V-NOTCH UPPER SHELF ENERGY (C_VUSE)

Material Description				Cu wt%	Initial C_vUSE ft-lbs	54 EFPY[1] Fluence 1/4T Location, n/cm^2	54 EFPY % Drop at 1/4T	54 EFPY C_vUSE at 1/4T
Reactor Vessel Beltline Region Location	**Material ID**	**Heat Number**	**Type**					
Regulatory Guide 1.99, Revision 2, Position 1.2								
Nozzle Belt Forging - Lower	AZJ 94	123V190	A508-64 Cl. 2	0.13	109	8.66E+18	21.3	86
Upper Shell Plate	C4344-1	C4344-1	SA-533 Gr B1	0.2	88	9.36E+18	28.5	63
Upper Shell Plate	C4344-2	C4344-2	SA-533 Gr B1	0.2	88	9.36E+18	28.5	63
Lower Shell Plate	C4347-1	C4347-1	SA-533 Gr B1	0.12	119	9.47E+18	20.7	94
Lower Shell Plate	C4347-2	C4347-2	SA-533 Gr B1	0.12	86	9.47E+18	20.7	68
Upper Shell Circ. Weld (Inside 40%)	SA-1769	71249	ASA/Linde 80	0.23	70	8.66E+18	EMA[2]	EMA[2]
Upper Shell Circ. Weld (Outside 60%)	WF-169-1	8T1554	ASA/Linde 80	0.16	70	Note 3	Note 3	Note 3
Upper Shell Axial Weld	WF-8	8T1762	ASA/Linde 80	0.19	70	8.42E+18	EMA[2]	EMA[2]
Upper Shell Axial Weld	WF-18	8T1762	ASA/Linde 80	0.19	70	8.42E+18	EMA[2]	EMA[2]
Upper Shell to Lower Shell Circ. Welds	WF-70	72105	ASA/Linde 80	0.32	70	9.12E+18	EMA[2]	EMA[2]
Lower Shell Axial Welds	SA-1580	8T1762	ASA/Linde 80	0.19	70	7.90E+18	EMA[2]	EMA[2]

Notes:

1. ¼ T Fluence values are calculated using RG 1.99, Revision 2, Equation (3) using inside wetted surface fluence values in Table 4.2-1. The base metal thickness is 8.44 in. and cladding thickness is 0.125 in.
2. Equivalent Margins Analyses (EMA) required because C_vUSE is less than 50 ft-lb.
3. The Upper Shell Circumferential Weld (Outside 60%) WF-169-1 is not located at the ¼ T location; therefore, C_vUSE projections are not applicable.

TABLE 4.2-3 EQUIVALENT MARGINS ANALYSIS FOR LEVEL A AND B SERVICE LOADS – J-INTEGRAL RESISTANCE AT A FLAW DEPTH OF ¼ T AT 54 EFPY

Beltline Weld ID	Surface Fluence (n/cm^2)	¼ T Fluence (n/cm^2)	$J_{0.1}$ material, Lower Bound ($in\text{-}lb/in^2$)	J_1 applied ($in\text{-}lb/in^2$)	$J_{0.1}$ / J_1	Acceptance Criterion for $J_{0.1}$ / J_1	Conclusion
54 EFPY Values							
WF-70	Not applicable (N/A)	9.12E+18	534	169	3.16	>1.0	Acceptable
WF-8, 18	N/A	8.42E+18	661	506	1.31	>1.0	Acceptable

TABLE 4.2-4 EQUIVALENT MARGINS ANALYSIS FOR LEVEL C AND D SERVICE LOADS - J-INTEGRAL RESISTANCE AT A FLAW DEPTH OF 1/10T AT 54 EFPY

Beltline Weld ID	Surface Fluence (n/cm^2)	$^1/_{10}$T Fluence (n/cm^2)	$J_{0.1}$ material, Lower Bound ($in\text{-}lb/in^2$)	J_1 applied ($in\text{-}lb/in^2$)	$J_{0.1}$ / J_1	Acceptance Criterion for $J_{0.1}$ / J_1	Conclusion
54 EFPY Values							
WF-70	1.56E19	1.27E+19	523	65	8.05	>1.0	Acceptable
WF-8, 18	1.44E19	1.18E+19	653	165	3.96	>1.0	Acceptable

TABLE 4.2-5 PTS REFERENCE TEMPERATURE EVALUATION THROUGH YEAR 60 (54 EFPY)

Reactor Vessel Beltline Region Material	Material ID	Heat Number	Type	Cu wt%	Ni wt%	Chem. Factor	Initial RT_{NDT} (°F)	54 EFPY Fluence at Inside Wetted Surface (n/cm^2)	Fluence Factor	ΔRT_{NDT} (°F)	Margin (°F)	RT_{PTS}	Screening Criteria (°F)
Nozzle Belt Forging - Lower	AZJ 94	123V190	A-508-64, Cl. 2	0.13	0.72	94.0	+3	1.48E+19	1.109	104.2	70.7	177.9	270
Upper Shell Plate	C4344-1	C4344-1	SA-533, Gr. B, Cl 1	0.20	0.54	115.8[1]	+20	1.60E+19	1.130	130.8	17.0	167.8	270
Upper Shell Plate	C4344-2	C4344-2	SA-533, Gr. B, Cl 1	0.20	.054	141.8	+20	1.60E+19	1.130	160.2	34.0	214.2	270
Lower Shell Plate	C4347-1	C4347-1	SA-533, Gr. B, Cl 1	0.12	0.58	82.6	-10	1.62E+19	1.133	93.6	34.0	117.6	270
Lower Shell Plate	C4347-2	C4347-2	SA-533, Gr. B, Cl 1	0.12	0.58	82.6	+45	1.62E+19	1.133	93.6	34.0	172.6	270
Upper Shell Circ. Weld (Inside 40%)	SA-1769	71249	ASA/ Linde 80	0.23	0.59	167.6	+10	1.48E+19	1.109	185.8	56.0	251.8	300
Upper Shell Circ. Weld (Outside 60%)	WF-169-1	8T1554	ASA/ Linde 80	0.16	0.57	143.9	-5	N/A[2]	N/A	N/A	N/A	N/A	300
Upper Shell Axial Weld	WF-8	8T1762	ASA/ Linde 80	0.19	0.57	152.4	-5	1.44E+19	1.101	167.8	68.5	**[231.3]**	270
Upper Shell Axial Weld	WF-18	8T1762	ASA/ Linde 80	0.19	0.57	152.4	-5	1.44E+19	1.101	167.8	68.5	**[231.3]**	270
Upper Shell to Lower Shell Circ Weld	WF-70	72105	ASA/ Linde 80	0.32	0.58	199.3	-26	1.56E+19	1.123	223.8	56.0	253.8	300
Lower Shell Axial Welds	SA-1580	8T1762	ASA/ Linde 80	0.19	0.57	152.4	-5	1.35E+19	1.083	165.1	68.5	228.6	270

Notes:

1. The chemistry factor was determined from surveillance data.
2. The Upper Shell Circumferential Weld (Outside 60%), WF-169-1, does not contact the inside surface, so there is no inside surface fluence calculated for this weld.

[xxx] - Limiting reactor vessel beltline region materials in accordance with 10 CFR 50.61.

TABLE 4.2-6 ADJUSTED REFERENCE TEMPERATURE PROJECTIONS AT 54 EFPY

Material Description				Initial RT_{NDT}	Chemistry Factor	54 EFPY Fluence 10^{19} n/cm^2			ΔRT_{NDT}, °F at 54 EFPY		Margin		ART, °F at 54 EFPY	
Reactor Vessel Beltline Region Location	Matl. ID	Heat Number	Type			Inside surface	¼T Location	¾T Location	¼T Location	¾T Location	¼T Location	¾T Location	¼T Location	¾T Location
Nozzle Belt Forging - Lower	AZJ 94	123V 190	SA-508, Cl. 2	+3	94.0	1.48	0.866	0.314	90.2	64.1	70.7	70.7	163.9	137.9
Upper Shell Plate	C4344-1	C4344-1	SA-533, Gr. B, Cl. 1	+20	115.8	1.60	0.936	0.340	113.6	81.4	17.0	17.0	150.6	118.4
Upper Shell Plate	C4344-2	C4344-2	SA-533, Gr. B, Cl. 1	+20	141.8	1.60	0.936	0.340	139.2	99.6	34.0	34.0	193.2	153.6
Lower Shell Plate	C4347-1	C4347-1	SA-533, Gr. B, Cl. 1	-10	82.6	1.62	0.947	0.344	81.4	58.3	34.0	34.0	105.4	82.3
Lower Shell Plate	C4347-2	C4347-2	SA-533, Gr. B, Cl. 1	+45	82.6	1.62	0.947	0.344	81.4	58.3	34.0	34.0	160.4	137.3
Upper Shell Circ. Weld (Inside 40%)	SA-1769	71249	Linde 80	+10	167.6	1.48	0.866	N/A(1)	160.8	N/A	56.0	N/A	**[226.8]**	N/A
Upper Shell Circ. Weld (Outside 60%)	WF-169-1	8T1554	Linde 80	-5	143.9	1.48	N/A(2)	0.314	N/A	98.2	N/A	68.5	N/A	161.7
Upper Shell Axial Weld	WF-8	8T1762	Linde 80	-5	152.4	1.44	0.842	0.306	145.1	102.9	68.5	68.5	208.5	166.4
Upper Shell Axial Weld	WF-18	8T1762	Linde 80	-5	152.4	1.44	0.842	0.306	145.1	102.9	68.5	68.5	208.5	166.4
Upper Shell to Lower Shell Circ. Weld	WF-70	72105	Linde 80	-26	199.3	1.56	0.912	0.331	194.2	138.7	56.0	56.0	224.2	**[168.7]**
Lower Shell Axial Welds	SA-1580	8T1762	Linde 80	-5	152.4	1.35	0.790	0.287	142.3	100.4	68.5	68.5	205.8	163.9

Notes:

1. The Upper Shell Circumferential Weld (Inside 40%), SA-1769, is not located at the ¾T location, so there is no ¾T fluence calculated for this weld.
2. The Upper Shell Circumferential Weld (Outside 60%), WF-169-1, is not located at the ¼T location, so there is no ¼T fluence calculated for this weld.

[xxx] – Controlling values of adjusted reference temperature.

4.3 METAL FATIGUE

Several thermal and mechanical fatigue analyses of plant mechanical components have been identified as time-limited aging analyses (TLAAs) for CR-3. These are discussed in the following Subsections.

The evaluation of components is used to demonstrate compliance with 10 CFR 54.21(c)(1) by using a combination of the methods of 54.21(c)(1)(i) for analyses that remain valid for the period of extended operation, 54.21(c)(1)(ii) for analyses that have been projected to the end of the period of extended operation, and 54.21(c)(1)(iii) for monitoring of design transients and managing the effects of aging for the period of extended operation. The following sections provide a summary of the evaluation results for each of the major components evaluated.

4.3.1 FATIGUE ANALYSES (NSSS COMPONENTS)

The CR-3 approach is to identify the latest design fatigue analyses associated with each NSSS component within the reactor coolant pressure boundary (RCPB) in order to demonstrate that the design analyses will remain bounding through the period of extended operation. Components within the scope of this review include non-pressure boundary reactor internals components.

Original fatigue design calculations assumed a large number of design transients corresponding to relatively severe system dynamics over the original 40-year design life. In general, actual plant operations have resulted in only a fraction of the originally expected fatigue duty. An assessment of the number of NSSS design transients that have occurred through December 2007 was compiled to determine the margin between the number of accrued cycles and the original 40-year design cycles.

The first step in the evaluation was to establish the current fatigue design bases for the major NSSS components. This was done by reviewing component design reports, amendments to those reports, and the assessment of the impact of the NRC approved measurement uncertainty recapture 1.6% power uprate to identify the full set of NSSS design transients used in the fatigue evaluations. The governing NSSS Design Transients are those identified in the CR-3 FSAR, Table 4-8, and listed in Table 4.3-1. Cumulative Usage Factor (CUF) values were compiled from CR-3 component design documents and are presented in Table 4.3-2.

The second step in the evaluation was to gather and review plant design information, actual plant transient data from the RCS and other sources, and archived RCS operational parametric data. This information was used to develop actual operational transients experienced from plant startup through December 2007. The transient data was obtained from the CR-3 Cycle and Transient Monitoring Program, input from plant personnel, and historical data obtained from CR-3 records.

There is considerable margin after 30 years of operation to the NSSS design transient cycles originally defined for 40 years, and CR-3 has determined there is no need to increase the number of NSSS design transients for the period of extended operation. The RCS CUFs may be conservatively projected to 60 years of operation by multiplying the 40-year CUFs by a factor of 1.5; this is equivalent to multiplying the NSSS design transient cycles by a factor of 1.5. Therefore, 40-year usage factors in excess of 0.67 (i.e., 1.0/1.5) may be assumed to exceed the ASME Code, Section III limit of 1.0 at 60-years. This method of usage factor projection is conservative since CR-3 has determined that it is unlikely that the NSSS design transients for 40 years will be exceeded at 60 years of operation.

The final step in the evaluation was to consider the effects of the reactor water environment on 40-year fatigue usage factors at selected NSSS locations as identified in NUREG/CR-6260, "Application of NUREG/CR-5999 Interim Design Curves to Selected Nuclear Power Plant Components," as required by NUREG-1801, Revision 1. This assessment is provided in Subsection 4.3.3.

The following subsections provide a summary of the fatigue analyses evaluation results for each of the major NSSS components evaluated.

4.3.1.1 Reactor Vessel

Summary Description

The reactor vessel (RV) was designed in accordance with Section III of the ASME Code – Class 1, for the replacement closure head, and Class A, for the remaining vessel items; therefore, metal fatigue was considered in the design of the RV components. CUF analyses for the RV are applicable TLAAs, since they are based on NSSS design transient cycles originally defined for 40 years. The NSSS Design Transients are those identified in Table 4.3-1. Forty-year design CUF values for the RV items are identified in Table 4.3-2.

Analysis

For the components that are part of the RV, one pressure-retaining item has a 40-year CUF that exceeds 0.67: the Lower Service Support Structure attachment weld with a CUF of 0.72. Therefore, the effects of aging on the intended function(s) will be adequately managed for the period of extended operation using the RCPB Fatigue Monitoring Program.

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.

4.3.1.2 Reactor Vessel Internals

Summary Description

The CR-3 reactor vessel internals (RVI) were designed and constructed prior to the development of ASME Code requirements for core support structures. Therefore, existing industry structural practice was used in the design of the internals structural members; and the only specific fatigue analyses performed in the original design were those that addressed high cycle fatigue reported in BAW-10051, "Design of Reactor Internals and Incore Instrument Nozzles for Flow Induced Vibration," September 1, 1972. In modifications following original design, plant-specific fatigue analyses were performed for the reactor vessel internals replacement bolts as presented in BAW-1843PA, "The B&WOG Evaluation of Internals Bolting Concerns in 177 FA Plants," January 1986, and BAW-1789P, "The B&WOG Evaluation of Internals Bolting Concerns in 177 FA Plants," August 1984. These topical reports summarize fatigue analyses performed to the ASME Code, Section III, Subsection NG, including both high-cycle fatigue from flow induced vibrations (FIV) and low-cycle fatigue from NSSS design transients. The NSSS Design Transients are those identified in Table 4.3-1. Forty-year design CUF values for the replacement RVI bolts are identified in Table 4.3-2.

Analysis

FIV Endurance Limit Assumptions

BAW-10051 calculated stress values for the redesigned RVI and compared them to endurance limit stress values. These endurance limit values were based on an assumed value of 1012 cycles for 40 years of operation. Since the fatigue curves at the time of design only went up to 106 cycles, these curves were extrapolated to 1012 cycles. The methodology used in BAW-10051 was extended from 40 years to 60 years by multiplying the assumed endurance limit cycles by 1.5 and then using 1013 cycles to determine the endurance limit based on more recent ASME fatigue curves which extend now to 1011 cycles. The component item stress values in BAW-10051 were compared to the recalculated endurance limit values and were shown to be acceptable. Therefore, the FIV analysis has been projected to the end of the period of extended operation.

Disposition: 10 CFR 54.21(c)(1)(ii) – The analysis has been projected to the end of the period of extended operation.

Cumulative Usage Factors for RV Internals Replacement Bolts

The RV internals bolts that were replaced at CR-3 include 120 Upper Core Barrel bolts made from A-286, 60 Lower Core Barrel bolts made from X-750, 96 Lower Thermal Shield bolts made from X-750, and 72 Surveillance Specimen Holder Tube (SSHT) bolts made from X-750. Two of these sets of replacement bolts have 40-year CUFs that exceed 0.67. These are the lower core barrel bolts with CUF of 0.759 and the lower thermal shield bolts with CUF of 0.84. Therefore, the effects of aging on the intended function(s) will be adequately managed for the period of extended operation using the CR-3 RCPB Fatigue Monitoring Program.

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.

4.3.1.3 Control Rod Drive Mechanism

Summary Description

The "Type C" control rod drive mechanism (CRDM) motor tube was designed in accordance with ASME Code, Section III, Class A, 1968 Edition with Addenda through Summer 1970, and metal fatigue was considered in the design of the component. CUFs of the CRDM motor were not calculated as it was shown that the motor tube did not require analysis for cyclic operation in accordance with ASME Section III, paragraph

N-415.1. The calculations performed to comply with N-415.1 are applicable TLAAs since they are based on NSSS design transient cycles originally defined for 40 years of operation. The NSSS design transients are those identified in Table 4.3-1.

Analysis

Calculations performed in accordance with N-415.1(a) through N-415.1(f) of the ASME Code, Section III for the CRDM motor tube are based on NSSS design transients. The NSSS design transients for CR-3 have not been increased for the period of extended operation. Therefore, the analyses performed in accordance with N-415.1(a) through N-415.1(f) of the ASME Code, Section III are acceptable for the period of extended operation since the NSSS design transients have not been revised.

Disposition: 10 CFR 54.21(c)(1)(i) – The analyses remain valid for the period of extended operation.

4.3.1.4 Reactor Coolant Pumps

Summary Description

The reactor coolant pumps (RCPs) were designed in accordance with the ASME Code, Section III, Class A, but were not code stamped, and metal fatigue was considered in the design of the component. CUFs of the RCPs are applicable TLAAs since the CUFs are based on NSSS design transient cycles originally defined for 40-years of operation. The NSSS Design Transients are those identified in Table 4.3-1. Forty-year design CUF values for the RCP items are identified in Table 4.3-2.

Analysis

The RCP items listed in Table 4.3-2 have CUFs below 0.67. The RCP pump cover has the largest 40-year design usage factor at 0.65.

Calculations performed in accordance with N-415.1(a) through N-415.1(f) of the ASME Code, Section III, for the RCP seal and heat exchanger are based on NSSS design transients. The NSSS design transients for CR-3 have not been increased for the period of extended operation.

Based on the above, the analyses for the RCP casing, cover, and shaft have been projected to the end of the period of extended operation, and the analyses of the RCP seal and heat exchanger performed in accordance with N-415.1(a) through N-415.1(f) of the ASME Code, Section III, are acceptable for the period of extended operation since the NSSS design transients have not been revised.

Disposition: **10 CFR 54.21(c)(1)(i) – The analyses remain valid for the period of extended operation, and**
10 CFR 54.21(c)(1)(ii) – The analyses have been projected to the end of the period of extended operation since the maximum CUF for RCP items is less than 0.67.

4.3.1.5 Steam Generators

Summary Description

The Once-Through Steam Generators (OTSGs) were designed in accordance with the ASME Code, Section III, Class A, and metal fatigue was considered in the design of the components. CUFs of the OTSG components are applicable TLAAs since the CUFs are based on NSSS design transient cycles originally defined for 40 years of operation. The NSSS Design Transients are those identified in Table 4.3-1. Forty-year design CUF values for the OTSG components are identified in Table 4.3-2.

Analysis

For the components that are part of the OTSG, five items have 40-year CUFs that exceed 0.67: the Emergency Feedwater (EFW) Nozzle Studs, Main Feedwater (MFW) Nozzle, Mechanical Sleeves, Remote Welded Plug, and the Support Skirt. The CUF values for these components are:

EFW Nozzle Studs	0.97
MFW Nozzle	0.92
Mechanical Sleeve	0.904
Remote Welded Plug	0.90
Support Skirt	0.89

Therefore, the effects of aging on the intended function(s) will be adequately managed for the period of extended operation by means of the CR-3 RCPB Fatigue Monitoring Program.

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.**

4.3.1.6 Pressurizer

Summary Description

The Pressurizer was designed in accordance with the ASME Code, Section III, Class A, and metal fatigue was considered in the design of the component. The Pressurizer surge nozzle was modified in 2007 to include a weld overlay over the Alloy 600 weld that connects the surge nozzle to a stainless steel safe end. The weld overlay was designed in accordance with the 1989 Edition of ASME Code, Section III, Subsection NB. CUFs for the Pressurizer are applicable TLAAs since they are based on NSSS design transient cycles originally defined for 40 years. The NSSS Design Transients are those identified in Table 4.3-1. Forty-year design CUF values for the Pressurizer are identified in Table 4.3-2.

Analysis

For the components that are part of the Pressurizer, three items have 40-year CUFs that exceed 0.67: the Surge Nozzle with weld overlay, the Heater Bundle closure seal weld, and the Thermowell Nozzle. The CUF for these components are:

Surge Nozzle with weld overlay	0.81
Heater Bundle closure seal weld	0.86
Thermowell Nozzle	0.71

Therefore, the effects of aging on the intended function(s) will be adequately managed for the period of extended operation by the CR-3 RCPB Fatigue Monitoring Program.

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.

4.3.1.7 Reactor Coolant Pressure Boundary Piping (USAS B31.7)

Summary Description

RCPB piping includes all piping within the ASME, Section XI, Subsection IWB inspection boundary at CR-3. The IWB inspection boundary includes B&W-supplied main coolant piping and portions of Architect/Engineer-supplied ancillary systems, e.g., Decay Heat Removal, Core Flood, and Make Up & Purification Systems, including Low Pressure Injection, High Pressure Injection, and Makeup/Letdown piping, attached to the Reactor Coolant System piping. The IWB inspection boundary within the ancillary systems typically extends to the first or second isolation valve or to a flow restricting orifice. The B&W-supplied main coolant piping was designed in accordance with USAS B31.7, and the ancillary systems connected to the main coolant piping were designed in accordance with USAS B31.1. TLAAs for the RCPB piping include CUFs for B31.7 designed piping, which are addressed in this subsection, and stress range reduction factors for B31.1 designed piping, which are addressed in Subsection 4.3.2.

The scope of USAS B31.7 piping at CR-3 includes the 36 in. hot leg piping, including attached branch connections and safe ends; 28 in. cold leg piping, including attached branch connections and safe ends; Pressurizer surge line piping; and Pressurizer spray line piping. CUFs of USAS B31.7 RCPB piping are applicable TLAAs since they are based on NSSS design transient cycles originally defined for 40 years of operation. The NSSS Design Transients are those identified in Table 4.3-1. Forty-year design CUF values for the RCPB piping are identified in Table 4.3-2.

Analysis

For the components that are part of the RCPB piping, the Pressurizer spray line piping and High Pressure Injection/Makeup (HPI/MU) Nozzle safe end CUFs exceed 0.67 at 40 years. The CUF of the Pressurizer spray line is 0.70, and the CUF of the HPI/MU Nozzle safe end is 0.95.

In accordance with NRC letter (H. Silver) to FPC (P. Beard), "Crystal River Unit 3 - NRC Bulletin 88-08 'Thermal Stress in Piping Connected to Reactor Coolant Systems,' (TAC No. M69621)," dated June 18, 1992, the piping items within the scope of NRC Bulletin 88-08 at CR-3 include the HPI/MU nozzle, safe end, and thermal sleeve. Fatigue of the HPI/MU nozzle, safe end, and thermal sleeve is evaluated above for the period of extended operation.

Therefore, the effects of aging on the intended function(s) will be adequately managed for the period of extended operation by means of the CR-3 RCPB Fatigue Monitoring Program.

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.

4.3.2 IMPLICIT FATIGUE ANALYSIS (B31.1 PIPING)

The RCPB piping evaluated in Subsection 4.3.1.7 includes the original B&W scope of supply that was designed in accordance with USAS B31.7. RCPB piping within ancillary systems attached to the main coolant piping and designed in accordance with USAS B31.1.0 are discussed in Subsection 4.3.2.1. Fatigue of Non-Class 1 piping designed to USAS B31.1.0 is discussed in Subsection 4.3.2.2.

4.3.2.1 USAS B31.1.0 Piping - RCPB Class 1

Summary Description

RCPB Class 1 piping designed in accordance with USAS B31.1.0 Piping Code includes piping in ancillary systems connected to the B&W-supplied main coolant piping. These systems include Decay Heat Removal, Core Flood, and Makeup & Purification Systems, including Low Pressure Injection, High Pressure Injection, and Makeup/Letdown piping.

The USAS B31.1.0 design does not require analyses of cumulative fatigue usage, but cyclic loading was considered in a simplified manner in the design process. The overall number of thermal cycles expected during the 40-year lifetime of these components was compared to limits (7,000 cycles or more), above which stress range reduction factors had to be applied to the allowable stress range for secondary stresses (expansion and displacement) to account for thermal cycling. These components are considered to have implicit fatigue analyses. Since the overall number of cycles could potentially increase during the period of extended operation, these implicit fatigue analyses are also considered to be TLAAs requiring evaluation for the period of extended operation.

For piping designed in accordance with the USAS B31.1.0-1967 Code rules, the designer was required to determine the overall number of thermal cycles anticipated for the component in 40 years, and was required to apply stress range reduction factors if this number exceeded 7,000. Power piping at CR-3 complies with USAS B31.1.0-1967. Since these analyses were based upon the number of cycles expected to occur during the original license period, these analyses are also considered to be TLAAs.

All RCPB piping attached to the B&W scope of supply was designed in accordance with USAS B31.1.0. The spool piece that is connected to the HPI/MU safe end was designed to USAS B31.1.0 but was analyzed for fatigue using USAS B31.7 in response to NRC Bulletin 88-08.

Analysis

<u>USAS B31.1.0 Piping: RCPB Class 1 Transient Assumptions</u>

The applicable transient cycles for piping systems designed in accordance with USAS B31.1.0-1967 rules were originally determined by summing the individual transients to which the component would be exposed in 40 years. In order to evaluate these TLAAs for 60 years, the numbers of cycles now expected to occur in 60 years should be compared to the numbers of design cycles that were considered in these analyses. For the RCPB systems, the number of thermal cycles correlates with plant heatups and cooldowns, which are limited to 240 cycles per Table 4.3-1. Since the transient set (and associated cycles) in the RCS Functional Specification is being maintained, the analytical basis for these components remains unchanged. Therefore, the analyses for these components remain valid for the period of extended operation in accordance with10 CFR 54.21(c)(1)(i).

Disposition: 10 CFR 54.21(c)(1)(i) – The analyses remain valid for the period of extended operation.

Cumulative Usage Factor for HPI/MU Safe End Spool Piece

The HPI/MU safe end is welded to a stainless steel spool piece that was analyzed for fatigue analysis in accordance with USAS B31.7 to support NRC Bulletin 88-08. The 40-year CUF for the spool piece is 0.94. Therefore, the effects of aging on the intended function(s) will be adequately managed for the period of extended operation by means of the RCPB Fatigue Monitoring Program.

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.

4.3.2.2 USAS B31.1.0 Piping - Non-Class 1

Summary Description

Piping designed in accordance with USAS B31.1.0 Piping Code was not required to have analyses of cumulative fatigue usage, but cyclic loading was considered in a simplified manner in the design process. The overall number of thermal cycles expected during the 40-year lifetime of these components was compared to limits (7,000 cycles or more), above which stress range reduction factors had to be applied to the allowable stress range for secondary stresses (expansion and displacement) to account for thermal cycling. These Non-Class 1 components are considered to have implicit fatigue analyses. Since the overall number of cycles could potentially increase during the period of extended operations, these implicit fatigue analyses are also considered to be TLAAs requiring evaluation for the period of extended operation.

For piping designed in accordance with the USAS B31.1.0-1967 code rules, the designer was required to determine the overall number of thermal cycles anticipated for the component in 40 years, and was required to apply stress range reduction factors if this number exceeded 7,000. Power piping at CR-3 complies with USAS B31.1.0-1967. Since these analyses were based upon the number of cycles expected to occur during the original license period, these analyses are also considered to be TLAAs.

Analysis

Components with Cycles Related to RCS Heatups and Cooldowns

The applicable transient cycles for piping systems designed in accordance with USAS B31.1.0-1967 rules were originally determined by summing the individual transients to which the component would be exposed in 40 years. In order to evaluate these TLAAs for 60 years, the numbers of cycles now expected to occur in 60 years should be compared to the numbers of design cycles that were considered in these analyses. For most systems, the number of thermal cycles correlates with plant heatups and cooldowns, which are limited to 240 cycles per Table 4.3-1. The applicable systems include:

- Steam and power conversion systems and components, and
- ESF Systems connected to the RCS.

Since the transient set (and associated cycles) in the RCS Functional Specification is being maintained, the analytical basis for these components remains unchanged. Therefore, the analyses for these components remain valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

Disposition: 10 CFR 54.21(c)(1)(i) – The analyses remain valid for the period of extended operation.

Components with Cycles Unrelated to RCS Heatups and Cooldowns

For components in systems whose cycles do not track plant heatups and cooldowns, a specific evaluation of the components operating history was performed. Examples of components in this group include:

- Engine exhaust components for diesel engines in the Emergency Diesel Generator, Emergency Feedwater and Fire Protection Systems,
- Sampling piping and components in the Liquid and Post-Accident Liquid Sampling Systems, and the
- Turbine-Driven Emergency Feedwater Pump Turbine.

Evaluations were performed that projected the number of expected cycles in 60 years. The evaluations concluded that the components remain qualified through the period of extended operation.

Disposition: 10 CFR 54.21(c)(1)(ii) – The analyses have been projected to the end of the period of extended operation.

4.3.3 ENVIRONMENTALLY-ASSISTED FATIGUE ANALYSIS

The effects of reactor water environment on fatigue were evaluated for a subset of representative components. The representative components selected were based upon the evaluations in NUREG/CR-6260, "Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components." The representative components evaluated are as follows:

- Reactor Vessel Shell and Lower Head (including incore instrumentation nozzles)
- Reactor Vessel Inlet and Outlet Nozzles
- Pressurizer Surge Line (including hot leg and Pressurizer surge nozzles)

- HPI/MU Nozzle
- Core Flood Nozzle
- Decay Heat Removal System Class 1 Piping

The methods used to evaluate environmental effects on fatigue were based on NUREG/CR-6583, "Effects of LWR Coolant Environments on Fatigue Design Curves of Carbon and Low Alloy Steels," NUREG/CR-5704, "Effects of LWR Coolant Environments on Fatigue Design Curves of Austenitic Stainless Steels," and NUREG/CR-6717, "Environmental Effects of Fatigue Crack Initiation in Piping and Pressure Vessel Steels." In addition, the method used to obtain environmental effects for nickel-based alloy was obtained from H. S. Metha and S. R. Goeeslin, "Environmental Factor Approach to Account for Water Effects in Pressure Vessel and Piping Fatigue Evaluations," Nuclear Engineering and Design, 1998. Environmental fatigue life correction factors (F_{en}) were used to obtain adjusted cumulative fatigue usage (U_{en}) which includes the effects of reactor water environments.

Environmentally-adjusted U_{en} factors are summarized in Table 4.3-3. Evaluations at all locations are based on application of environmental penalty factors to the ASME 40-year CUF values. Bounding F_{en} values of 2.45 for low-alloy steel, 15.35 for stainless steel, and 1.49 for Alloy 600 were applied to the 40-year design CUFs with the exception of surge line piping and decay heat injection piping.

For surge line piping, the ASME Section III analysis of record for CR-3 was revised to include the effects of environmentally assisted fatigue. The environmental correction factor F_{en} from NUREG/CR-5704 was used to determine the number of allowable cycles for each load pair. The F_{en} correction factor was obtained by integration from peak to valley considering transformed metal temperature, transformed strain rate, and transformed dissolved oxygen. The strain rate was assumed to be at 0.0004%/sec or less, and transformed strain rate was held constant at Ln (0.001). Based on historical data, dissolved oxygen is 0.05 ppm or less, and transformed oxygen was held constant at 0.026. Transformed metal service temperature was determined by integration of metal temperature for the load pair analyzed. Therefore, the F_{en} varies from 2.55 (when metal temperature is less than 392 °F) to a maximum of 15.35 (when metal temperature equals or exceeds 392 °F). Thermal striping, which was considered separately, was assigned an F_{en} of 1.0 as the maximum calculated strain amplitude is less than the threshold strain amplitude of 0.097% listed in NUREG/CR-5704.

The Decay Heat Injection piping at CR-3 was designed in accordance with USAS B31.1 and therefore did not receive an explicit CUF evaluation. A fatigue evaluation of the Decay Heat Injection piping was performed specifically for License Renewal using USAS B31.7, 1969 Edition. The CUF was multiplied by the bounding F_{en} value of 2.55.

Based on the results of this evaluation, and in accordance with 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 using the CR-3 RCPB Fatigue Monitoring Program.

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.

4.3.4 RCS LOOP PIPING LEAK-BEFORE-BREAK ANALYSIS

Summary Description

The successful application of leak-before-break (LBB) to the CR-3 RCS main coolant piping is described in Topical Report BAW-1847, "The B&W Owners Group Leak-Before-Break Evaluation of Margins Against Full Break for RCS Primary Piping of B&W Designed NSSS," Revision 1, September 1985. This report provides the technical basis for evaluating postulated flaw growth in the main RCS piping (36 in. hot leg piping and 28 in. cold leg piping) under normal plus faulted loading conditions and was approved by the NRC for the current term of operation. The TLAA in report BAW-1847, Revision 1, addresses fatigue flaw growth. In addition, Section 3.3.4.3 of the report includes a qualitative assessment of thermal aging of cast austenitic stainless steel (CASS) RCP inlet and exit nozzles; this assessment is not considered a TLAA. However, reduction of fracture toughness by thermal aging of the RCP inlet and exit nozzles was evaluated for License Renewal to ensure that the conclusions of the LBB evaluation reported in BAW-1847, Revision 1, remain valid for the period of extended operation.

Analysis

<u>Fatigue Flaw Growth</u>

The LBB analysis reported in BAW-1847, Revision 1, was performed in accordance with the guidance provided in Section 5.2, Item (d), of NUREG-1061, Volume 3, "Report of the U.S. Nuclear Regulatory Commission Piping Review Committee, Evaluation of Potential for Pipe Breaks." Specifically, a surface flaw was postulated at selected locations of the piping system (i.e., highest stress coincident with the lower bound of the material properties for base metal, weldments, and safe ends); and a fatigue crack growth analysis for postulated flaws was then performed to demonstrate that the surface flaws are likely to propagate in the through-wall direction and develop leakage before they will propagate circumferentially around the pipe. Flaw growth calculations are reported in Section 4.3, Table 4-3, of BAW-1847, Revision 1, and are based on 240 heatup and cooldown cycles and 22 cycles of safe shutdown earthquake.

The original transient cycles that were defined for 40 years of operation for the RCS components have not been revised for License Renewal and are being monitored by the CR-3 Reactor Coolant Pressure Boundary Fatigue Monitoring Program. If a transient cycle count approaches or exceeds the allowable design limit, corrective actions are taken. Therefore, the flaw growth evaluation reported in BAW-1847, Revision 1, remains valid for the period of extended operation in accordance with 10 CFR 54.21 (c)(1)(i) since CR-3 has not revised the transients defined in the RCS design specification for License Renewal.

Thermal Aging of CASS RCP Suction and Discharge Nozzles

The susceptibility of the RCS main coolant piping to thermal aging was qualitatively addressed in Section 3.3.4.3 of BAW-1847, Revision 1. As described in BAW-2243A, "Demonstration of the Management of Aging Effects for the Reactor Coolant System Piping," The B&W Owners Group Generic License Renewal Program, June 1996, there are no RCS main coolant piping segments fabricated from CASS. However, the heat affected zone of the welded joint that connects the wrought austenitic stainless steel 28 in. pump transition piece to the CASS RCP inlet and exit nozzles may be susceptible to thermal embrittlement. Limited data regarding thermal aging of CASS material was available at the time of the preparation of BAW-1847, Revision 1. In the report, the values of fracture toughness for aged CASS were assumed to be bounded by the ferritic piping and ferritic weldments. Since the publication of BAW-1847, Revision 1, a significant amount of data has been obtained regarding thermal aging of CASS materials. Test data obtained from an Argonne National Laboratory Report by Chopra and Shack, "Assessment of Thermal Embrittlement of Cast Stainless Steels," NUREG/CR-6177, U.S. Nuclear Regulatory Commission, Washington DC, May 1994, indicate that prolonged exposure of CASS to reactor coolant operating temperatures can lead to reduction of fracture toughness by thermal embrittlement. The fracture toughness curves for the ferritic base metal and ferritic weld metals used in the RCS piping LBB analysis were compared to the lower-bound fracture toughness curves of CR-3 RCP CASS materials (i.e., statically cast CF8M) from the Argonne report. The fracture toughness curve of the lower-bound CASS material is below the fracture toughness curves used in the RCS piping LBB analysis. Therefore, the assumption in BAW-1847, Revision 1, that the fracture toughness of the ferritic piping and ferritic weldments bounds the fracture toughness of CASS required further evaluation for License Renewal.

A flaw stability analysis was performed using the lower-bound CASS fracture toughness curves from the Argonne report cited above to show acceptability of LBB for the RCS main coolant piping for the period of extended operation. The most limiting material and location used in the RCS piping LBB analysis (i.e., BAW-1847, Revision 1) was determined to be the base metal material of the straight section of the 28 in. cold leg pipe. Both the suction and discharge nozzles of the RCP casings are attached to the 28 in. cold leg pipes and have similar geometries and applied loads as the limiting location used for the LBB analysis. The discharge and suction nozzles of the RCP casings were evaluated for LBB using lower-bound CASS fracture toughness properties.

Bounding 10 gpm leakage crack sizes (i.e., a margin of 10 on the plant's leak detection capability) for the RCP suction and discharge nozzle were determined using a method that is consistent with that reported in BAW-1847, Revision 1. In the revised analysis, the applied loadings were considered using the absolute sum load combination method. Therefore, in accordance with NUREG-0800, Standard Review Plan (SRP) 3.6.3, a margin of 1.0 on load was used. The leakage flaw size for the suction nozzle was determined to be 4.31 in. and the leakage flaw size for the discharge nozzle was determined to be 4.43 in. In addition, a crack extension value of 0.6 in. was considered in the flaw stability analysis. A flaw stability analysis was performed for the RCP inlet (suction) and exit (discharge) nozzles, and the discharge nozzle was found to be limiting. The maximum applied J value at the discharge nozzle, for the 10 gpm leakage flaw size, was determined to be 0.510 kips/in. The critical crack size was determined to be 10.8 in. Therefore, the margin on flaw size was determined to be 2.4 (i.e., 10.8/4.43). This is greater than the required margin of 2.0 in accordance with SRP 3.6.3. Based on the results of this analysis, it is concluded that the required margins for LBB per SRP 3.6.3 are met, even with consideration of the lower-bound CASS fracture toughness properties for the suction and discharge nozzles.

Summary: Leak-Before-Break for the Period of Extended Operation

In summary, it has been demonstrated that the fatigue flaw growth analysis reported in BAW-1847, Revision 1, remains valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i) since the number of NSSS design transients will not be revised for License Renewal. The remainder of the generic LBB analysis for the B&W operating plants reported in BAW-1847, Revision 1, remains valid for the period of extended operation with the exception of the original qualitative assessment of reduction of fracture toughness by thermal aging of CASS. The assessment of reduction of fracture toughness by thermal aging of CASS is not considered a TLAA. Reduction of fracture toughness of the RCP nozzles was determined to be acceptable for the period of extended operation through the flaw stability analysis described above. In addition, recent NRC concerns related to Alloy 82/182 and LBB analyses are addressed in the industry's submittal MRP-140, "Materials Reliability Program: Leak-Before-Break Evaluation for PWR Alloy 82/182 Welds," EPRI, Palo Alto, CA: 2005, 1011808. The Alloy 82/182 welds within the scope of BAW-1847, Revision 1, are the welds that connect the 28 in. stainless steel carbon steel cold leg piping to the stainless safe pump transition pieces. Based on the above, the flaw growth analysis remains valid for the period of extended operation.

Disposition: 10 CFR 54.21(c)(1)(i) – The RCS loop LBB analysis remains valid for the period of extended operation.

TABLE 4.3-1 NSSS TRANSIENT CYCLES

ID. No.	ASME Transient Classification	Transient Description[1]	40-Year Design Cycles
1A	Normal	RCS Heatup 70°F to 557°F at 100 °F/hr	240
1B	Normal	RCS Cooldown 557°F to 70°F at 100 °F/hr	240
7		Step Load Reduction (100% to 8% Power)	
	Upset	Resulting from Turbine Trip	160
	Upset	Resulting from Electrical Load Rejection	150
8		Reactor Trips	
	Upset	Resulting from Loss of All Reactor Coolant Pumps	40
	Upset	Due to Turbine Trip Without Automatic Control Action	160
	Upset	Resulting from Complete Loss of All Main Feedwater	88
	Upset & Emerg.	Included in Transients 11, 15, 17A, and 17B	110
9	Upset	Rapid Depressurization (2,200 psi to 300 psi in 1 hr)	40
10	Upset	Change of Flow (Loss of One or More Reactor Coolant Pumps)	20
11	Upset	Rod Withdrawal Accident	40
12		Hydrostatic Tests at 3,125 psig	
	Test	RCS Components (Primary Side)	20
	Test	OTSG A (Secondary Side)	35
	Test	OTSG B (Secondary Side)	35
15	Upset	Loss of Station Power	40
17A	Upset	Loss of Feedwater to One OTSG	20
17B	Emergency	Stuck Open Turbine Bypass Valve	10
22		High Pressure Injection Valve Test	
	Normal	Actuation of Makeup Valve MUV-23	40
	Normal	Actuation of Makeup Valve MUV-24	40
	Normal	Actuation of Makeup Valve MUV-25	40
	Normal	Actuation of Makeup Valve MUV-26	40
22		Core Flooding Check Valve Test	
	Normal	Core Flood Tank CFT-1A	240
	Normal	Core Flood Tank CFT-1B	240
8		High Pressure Injection Actuations	
	Upset	MUV-23	11
	Upset	MUV-24	11
	Upset	MUV-25	11
	Upset	MUV-26	11
No ID		High Pressure Auxiliary Pressurizer Spray	15
14	Upset	Control Rod Drop	40
25	Upset	Refill of Hot, Dry Depressurized OTSG	
		OTSG A	50
		OTSG B	50
26	Upset	Emergency Feedwater Actuation	
		Flow Initiation to OTSG A Upper Feed Nozzles	1510
		Flow Initiation to OTSG B Upper Feed Nozzles	1510

Note:

1. Consists of the transients tracked as part of the RCPB Fatigue Monitoring Program.

TABLE 4.3-2 DESIGN FATIGUE USAGE FACTORS

List No.	Component	Location	40-Year Fatigue Usage
1	Reactor Vessel		
2		Control Rod Drive Nozzle (J-Groove Weld)	0.65
3		Closure Head Dome-to-Flange	0.03
4		RV Flange-to-Shell Transition	0.02
5		Closure Head Studs	0.43
6		RV Inlet Nozzle	0.11
7		RV Outlet Nozzle	0.46
8		RV Lower Head	0.022
9		Bottom-Mounted Nuclear Instrument Nozzle	0.58
10		Core Flood Nozzle-Base of Nozzle	0.26
11		RV Support Skirt	0.085
12		Lower Service Support Structure Attachment Weld	0.72
13	Reactor Vessel Internals		
14		Upper Core Barrel Replacement Bolts	0.0
15		Lower Core Barrel Replacement Bolts	0.759
16		Thermal Shield (Lower) Replacement Bolts	0.84
17		Surveillance Specimen Holder Tube Replacement Bolts	<0.001
18	Control Rod Drive Mechanism		
19		Type C-Motor Tube Housings and Extension	Exempt
20	Reactor Coolant Pumps		
21		RCP Casing (Volute/Upper Flange)	0.32
22		RCP Cover	0.65
23		RCP Lower Shaft	0.007
24		RCP Seal & Heat Exchanger	Exempt
25	Steam Generators		
26		Upper and Lower Tubesheet	0.13
27		Primary Inlet Nozzle	0.03
28		Primary Outlet Nozzle	0.03
29		Emergency Feedwater Nozzle	0.57
30		Emergency Feedwater Nozzle Studs	0.97
31		Emergency Feedwater Sleeve Retainer Bar	0.67
32		OTSG Shell	0.00
33		Main Feedwater Nozzle	0.92
34		Mechanical Sleeve	0.904

TABLE 4.3-2 (continued) DESIGN FATIGUE USAGE FACTORS

List No.	Component	Location	40-Year Fatigue Usage
35	Steam Generators (continued)	Remote Weld Plug (plug-to-tubesheet weld)	0.90
36		Steam Generator Support Skirt	0.89
37	Pressurizer		
38		External Supports (Shell)	0.02
39		Shell	0.10
40		Surge Nozzle (weld overlay)	0.8136
41		Spray Nozzle	0.143
42		Heater Bundle Closure (seal weld)	0.86
43		Heater Stud	0.30
44		Thermowell Nozzle	0.71
45		Heater Bundle Closure Diaphragm	0.60
46	Reactor Coolant Pressure Boundary Piping		
47		Cold Leg (28 in.) Hot Leg (36 in.)	0.362 0.351
48		Surge Line Elbows	0.37
49		Surge Line-Non Elbows	0.40
50		Hot Leg Surge Line Nozzle	0.143 (CS nozzle) 0.118 (SS pipe)
51		Spray line piping	0.70
52		High Pressure Injection/Makeup Safe End Spool piece-to-safe end weld (B31.1 piping)	0.95 0.94
53		Cold Leg Spray Nozzle	0.63

TABLE 4.3-3 ENVIRONMENTALLY-ADJUSTED CUF VALUES

Component	Environmentally Adjusted CUF	F_{en}	A	B	C	54.21 (c) (1)
Reactor Vessel Shell and Lower Head (LAS)	0.053	2.45	NA	NA	NA	(iii)
Incore Instrumentation Nozzle (Ni-Cr-Fe)	0.86	1.49	NA	NA	NA	(iii)
Reactor vessel inlet nozzle (LAS)	0.27	2.45	NA	NA	NA	(iii)
Reactor vessel outlet nozzle (LAS)	0.76 (Note 1)	2.45	X (Note 1)	NA	NA	(iii)
Surge line piping up to but not including weld piping next to weld overlays (SS)	1.54	$2.55<F_{en}<15.35$ (Note 2)	X (Note 2)	X (Note 2)	NA	(iii)
Surge line hot leg nozzle and stainless steel piping adjacent to weld overlay (SS)	0.29	15.35	NA	NA)	NA	(iii)
Surge line Pressurizer nozzle and stainless steel safe end adjacent to weld overlay (SS)	0.95	15.35	NA	X (Note 3)	NA	(iii)
Core flood nozzle (LAS)	0.64	2.45	NA	NA	NA	(iii)
HPI/MU nozzle (SS safe end)	1.89	15.35	NA	NA	NA	(iii)
Decay heat injection Class 1 piping (Stainless Steel Tee)	0.011	2.55	NA	NA	NA	(iii)

A. Reduced cycles used in the calculation.
B. Refined calculations performed.
C. Redefined transients used in the evaluation. Redefinition means that transient thermal-hydraulic definitions (e.g., temperature and pressure) are redefined.

Notes:
1. In accordance with Table 4.3-2, the RV outlet nozzle CUF is 0.46 which includes 30,000 power loading and unloading transients in excess of those permitted by the CR-3 design basis. Removing this conservatism results in a reduction of the RV outlet nozzle CUF from 0.46 to 0.31.
2. The full set of NSSS design transients are used with the exception of power loading and unloading. These were reduced from 48,000 to 2,600 based on a review of operating data. Transient regrouping was performed for heatups and cooldowns based on CR-3 operating experience. Transient 22 (HPI test) was revised based on revision to CR-3 procedures that eliminate the thermal transient. F_{en} was based on NUREG/CR-5704 considering transformed strain rate, transformed dissolved oxygen, and transformed metal service temperature.
3. Considers weld overlay and is the CUF at inside surface of original pipe adjacent to weld overlay.

4.4 ENVIRONMENTAL QUALIFICATION OF ELECTRICAL EQUIPMENT

4.4.1 10 CFR 50.49 THERMAL, RADIATION, AND CYCLICAL AGING ANALYSES

Thermal, radiation, and cyclical aging analyses of plant electrical and I&C components required to meet 10 CFR 50.49 have been identified as time-limited aging analyses (TLAAs) for CR-3.

Summary Description

The NRC has established nuclear station environmental qualification (EQ) requirements in 10 CFR 50, Appendix A, Criterion 4, and in 10 CFR 50.49. Section 50.49 specifically requires that an EQ program be established to demonstrate that certain electrical components located in harsh plant environments (that is, those areas of the plant that could be subject to the harsh environmental effects of a loss-of-coolant accident (LOCA), high energy line breaks (HELBs), or post-LOCA radiation) are qualified to perform their safety function in those harsh environments after the effects of in-service aging. 10 CFR 50.49 requires that the effects of significant aging mechanisms be addressed as part of environmental qualification.

EQ Program Background

The CR-3 EQ Program meets the requirements of 10 CFR 50.49 for the applicable electrical components important to safety. 10 CFR 50.49 defines the scope of components to be included, requires the preparation and maintenance of a list of in-scope components, and requires the preparation and maintenance of a qualification file that includes component performance specifications, electrical characteristics and the environmental conditions to which the components could be subjected. Section 50.49(e)(5) contains provisions for aging that require, in part, consideration of all significant types of aging degradation that can affect component functional capability. Section 50.49(e) also requires replacement or refurbishment of components not qualified for the current license term prior to the end of designated life, unless additional life is established through ongoing qualification. Section 50.49(f) establishes four methods of demonstrating qualification for aging and accident conditions. Sections 50.49(k) and (l) permit different qualification criteria to apply based on plant and component vintage. Supplemental EQ regulatory guidance for compliance with these different qualification criteria is provided in NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment," July 1981; and RG 1.89, Rev. 1, "Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants," June 1984. Compliance with 10 CFR 50.49 provides reasonable assurance that the component can perform its intended functions during accident conditions after experiencing the effects of in-service aging.

The CR-3 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 CR-3 EQ Program that specify a qualification of at least 40 years are TLAAs for license renewal because all of the criteria contained in 10 CFR 54.3 are met.

Under 10 CFR 54.21(c)(1)(iii), the CR-3 EQ Program, which implements the requirements of 10 CFR 50.49 (as further defined and clarified by DOR Guidelines, NUREG-0588, and RG 1.89, Rev. 1), is viewed as an aging management program for License Renewal. Reanalysis of an aging evaluation to extend the qualifications of components is performed on a routine basis as part of the CR-3 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 CR-3 EQ Program will manage the aging effects of the components associated with the environmental qualification TLAA. Section 4.4.2.1.3 of NUREG-1800 states that the staff evaluated the EQ program (10 CFR 50.49) and determined that it is an acceptable aging management program to address environmental qualification according to 10 CFR 54.21(c)(1)(iii). The evaluation referred to in the SRP-LR contains sections on "EQ Component Reanalysis Attributes" and "Evaluation and Technical Basis," which is the basis of the description provided below.

EQ Component Reanalysis Attributes

The reanalysis of an aging evaluation is normally performed to extend the qualification by reducing excess conservatism incorporated in the prior evaluation. Reanalysis of an aging evaluation to extend the qualification of a component is performed on a routine basis pursuant to 10 CFR 50.49(e) as part of the CR-3 EQ Program. While a component life-limiting condition may be due to thermal, radiation or cyclical aging, the vast majority of component aging limits are based on thermal conditions. Conservatism may exist in aging evaluation parameters, such as the assumed peak ambient temperature of the component, an activation energy, or in the application of a component (de-energized versus energized). The reanalysis of an aging evaluation is documented according to CR-3 quality assurance program requirements, which require the verification of assumptions and conclusions. As already noted, important attributes of a reanalysis include analytical methods, data collection and reduction methods, underlying assumptions, acceptance criteria, and corrective actions (if acceptance criteria are not met). These attributes are discussed below.

Analytical Methods

The CR-3 EQ Program uses the same analytical models in the reanalysis of an aging evaluation as those previously applied during the prior evaluation. The Arrhenius methodology is an acceptable thermal model for performing a thermal aging evaluation. The analytical method used for a radiation aging evaluation is to demonstrate qualification for the total integrated dose (that is, normal radiation dose for the projected installed life plus accident radiation dose). For license renewal, one acceptable method of establishing the 60-year normal radiation dose is to multiply the 40-year normal radiation dose by 1.5 (that is, 60 years/40 years). The result is added to the accident radiation dose to obtain the total integrated dose for the component. For cyclical aging a similar approach may be used.

Data Collection & Reduction Methods

Reducing excess conservatism in the component service conditions (for example, temperature, radiation, cycles) used in the prior aging evaluation is the chief method used for a reanalysis per the CR-3 EQ Program. Temperature data used in an aging evaluation should be conservative and based on plant design temperatures or on actual plant temperature data. When used, plant temperature data can be obtained in several ways including monitors used for technical specification compliance, other installed monitors, measurements made by plant operators during rounds, and temperature sensors on large motors. A representative number of temperature measurements are conservatively evaluated to establish the temperatures used in an aging evaluation. Plant temperature data may be used in an aging evaluation in different ways, such as: (a) directly applying the plant temperature data in the evaluation or (b) using the plant temperature data to demonstrate conservatism when using plant design temperatures for an evaluation. Any changes to material activation energy values as part of a reanalysis must be justified. Similar methods of reducing excess conservatism in the component service conditions used in prior aging evaluations can be used for radiation and cyclical aging.

Underlying Assumptions

CR-3 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 CR-3 EQ Program, the reanalysis of an aging evaluation could extend the qualification of the component. If the qualification cannot be extended by reanalysis, the component must be refurbished, replaced, or requalified prior to exceeding the period for which the current qualification remains valid. A reanalysis is to be performed in a timely manner (that is, sufficient time is available to refurbish, replace, or requalify the component if the reanalysis is unsuccessful).

The CR-3 EQ Program has been demonstrated to be capable of programmatically managing the qualified lives of the components falling within the scope of the program for License Renewal. Based on the above review, the continued implementation of the CR-3 EQ Program provides reasonable assurance that the aging effects will be managed and that EQ components will continue to perform their intended functions for the period of extended operation. This result meets the requirements of 10 CFR 54.21(c)(iii). A comparison of the CR-3 Environmental Qualification Program to the corresponding program in NUREG-1801 is provided in Appendix B, Subsection B.3.2.

Disposition: 10 CFR 54.21(c)(1)(iii) – Aging of components within the EQ Program will be adequately managed for the period of extended operation.

4.5 CONCRETE CONTAINMENT TENDON PRESTRESS

4.5.1 TENDON STRESS RELAXATION ANALYSIS

Summary Description

The CR-3 Reactor Building consists of a prestressed reinforced concrete cylinder and hemispherical dome. The cylinder wall and dome roof have been provided with a post-tensioning system. The cylinder wall is prestressed utilizing a two-way post-tensioning system. The dome roof is prestressed utilizing a three-way post-tensioning system. The prestressing tendons tend to lose their prestressing forces with time due to creep and shrinkage of concrete and relaxation of the prestressing steel. Loss of tendon prestress is a TLAA; therefore, the adequacy of the prestressing forces is reviewed for the period of extended operation.

There have been eight tendon surveillance tests since CR-3 plant startup in December 1976. Since 1997, these tests have been performed under the ASME Section XI, Subsection IWL Program. The IWL program inspects a sample of tendons from each category (i.e., dome, vertical, and hoop). The program calculates the regression analysis trend lines of these three groups based on individual tendon forces consistent with NRC Information Notice 99-10, "Degradation of Prestressing Tendon Systems in Prestressed Concrete Containments," that is, using individual-tendon data rather than averages and using all prior test data. It confirms that the acceptance criteria have been met and, therefore, that tendon prestresses will remain above minimum required values for the succeeding inspection interval.

Analysis

For the purposes of extending the CR-3 plant operating license, regression analysis was used to extrapolate the tendon prestress forces to the end of the extended period of operation. Figures 4.5-1, 4.5-3, and 4.5-5 illustrate the overall results of the regression analysis for the three groups of tendons. Figures 4.5-2, 4.5-4, and 4.5-6 show the results for the individual control tendons.

The resulting trend line for control tendon 61V08 shown in Figure 4.5-4 has not been projected forward to the end of the extended period of operation. The original vertical control tendon, 12V01, required retensioning in the 7th interval surveillance. Tendon 61V08 was selected as the new control tendon for subsequent surveillances. As a result, only two data points are available for this tendon, from surveillance intervals 7 and 8. The measurement from surveillance interval 8 was 2% higher than that for surveillance interval 7, a difference that is within the overall accuracy of the testing system. Since the trend line generated from the two points has a positive slope, more data from future surveillances will be needed before an accurate trend line for tendon 61V08 can be established.

The values computed demonstrated that prestress in all three groups of tendons should remain above the applicable minimum required values for the extended period of operation and that the tendons should maintain their design basis function. The following tables and figures document the results of these analyses:

Table 4.5-1	Summary of Tendon Data
Table 4.5-2	Dome Tendon Data
Table 4.5-3	Vertical Tendon Data
Table 4.5-4	Hoop Tendon Data
Figure 4.5-1	Projected Force in Dome Tendons
Figure 4.5-2	Projected Force in Dome Control Tendon D212
Figure 4.5-3	Projected Force in Vertical Tendons
Figure 4.5-4	Projected Force in Vertical Control Tendons 61V08 and 12V01
Figure 4.5-5	Projected Force in Hoop Tendons
Figure 4.5-6	Projected Force in Hoop Control Tendons 51H26 and 46H21

The TLAA evaluation addressed tendon loss of preload, using 10 CFR 54.21(c)(1)(ii) to project the tendon preload to the end of the 60-year service period for each group of tendons. The projected "average" preload values at the end of the 60-year service period are then compared with the required minimum average tendon preload. For each group of tendons, the projected preload value exceeds the required minimum average tendon preload. Therefore, prestress in all three groups of tendons will remain above the applicable minimum required values for the period of extended operation; and the tendons will perform their intended function.

Disposition: 10 CFR 54.21(c)(1)(ii) – The analyses have been projected to the end of the period of extended operation; and

TABLE 4.5-1 SUMMARY OF TENDON DATA

Tendon Type	Total Number of Tendons	Minimum Required Average Values (Kips/Tendon)	Value Extrapolated to End of Period of Extended Operation (Kips/Tendon)	Conclusion
Dome	123	1215	1255	Note 1
Vertical	144	1149	1478	Note 1
Hoop	282	1252	1329	Note 1

Note:

1. The value at the end of the period of extended operation is greater than the minimum required value.

TABLE 4.5-2 DOME TENDON DATA

Surveillance No.	Tendon	Years Since Initial Tensioning	Measured Force/ Tendon	Computed Value
1	D139	3.22	1590	1553
	D215	3.25	1644	1553
	D221	3.14	1511	1555
	D228	3.11	1524	1556
	D234	3.1	1513	1556
	D340	3.11	1562	1556
2	D122	5.41	1647	1513
	D140	5.41	1587	1513
	D208	5.4	1594	1513
	D323	5.47	1526	1512
	D331	5.5	1461	1512
3	D123	6.99	1304	1493
	D212*	6.9	1338	1494
	D215	6.98	1594	1494 (Note 1)
	D322	6.91	1494	1494
	D329	6.92	1506	1494
4	D105	12.92	1453	1445
	D212*	12.9	1276	1445
	D328	12.89	1619	1445
5	D215	19.01	1518	1415 (Note 1)
	D242	18.96	1425	1415
	D231	19.06	1335	1414
6	D113	22.99	1427	1400
	D115	22.7	1380	1401
	D212*	22.9	1335	1400
	D304	23	1598	1400
	D311	23.03	1408	1400

TABLE 4.5-2 (continued) DOME TENDON DATA

Surveillance No.	Tendon	Years Since Initial Tensioning	Measured Force/ Tendon	Computed Value
7	D126	26.81	1377	1388
	D212*	26.6	1292	1388
	D339	26.47	1507	1389
8	D129	32.96	1289	1372
	D212*	32.92	1277	1372
	D238	32.89	1511	1372
Extrapolated		63 (Note 2)		1321

* Indicates Control Tendon

Notes:

1. This value was not used in the regression analysis as the tendon was retensioned in an earlier surveillance.
2. The extended period of operation will end in the 63rd year from the date of initial tensioning.

TABLE 4.5-3 VERTICAL TENDON DATA

Surveillance No.	Tendon	Years Since Initial Tensioning	Measured Force/ Tendon	Computed Value
1	12V19	3.26	1589.5	1671
	12V20	2.87	1785	1680
	12V21	3.26	1632.5	1671
	23V15	3.22	1590	1672
	34V06	3.16	1678	1673
	45V03	3.19	1678	1673
	56V01	3.28	1718.5	1671
2	12V12	5.47	1718	1638
	12V20	5.2	1740	1641
	23V05	5.57	1580	1637
	34V01	5.54	1569	1637
	45V06	5.53	1685	1637
	56V01	5.59	1707	1636
	56V20	5.48	1630	1638
3	12V01*	7.07	1315	1621 (Note 1)
	34V06	6.99	1600	1622 (Note 2)
	34V19	7.02	1640	1622
	45V16	7.01	1575	1622
	56V11	7.04	1565	1621
	61V05	7.07	1519	1621
4	12V01*	13.07	1535	1581
	34V04	13.07	1623	1581
	56V02	13.04	1648	1581
5	34V06	19.08	1590	1557
	61V14	19.08	1587	1557
	56V15	19.18	1541	1556
6	12V01*	23.15	1471	1544
	23V02	23.15	1609	1544
	61V21	23.25	1525	1544

TABLE 4.5-3 (continued) VERTICAL TENDON DATA

Surveillance No.	Tendon	Years Since Initial Tensioning	Measured Force/ Tendon	Computed Value
7	12V01*	27.028	1446	1534
	12V02	27.12	1546	1534
	23V24	27.14	1521.8	1534
	45V14	26.94	1552	1534
	61V08*	26.91	1476	1534
8	12V01	33.14	1559.95	1521 (Note 2)
	45V20	33.03	1456.8	1521
	61V08*	33.05	1505.98	1521
	61V17	33.11	1580.18	1521
Extrapolated		63 (Note 3)		1478

*Indicates control tendon -The original control tendon, 12V01, required retensioning in the 7th interval surveillance. Tendon 61V08 was selected as the new control tendon for subsequent surveillances.

Notes:

1. Data for this tendon for this surveillance was considered erroneous and not used in constructing the trend line. The force value was substantially lower than the value from subsequent surveillance tests.
2. This value was not used in the regression analysis as the tendon was retensioned in an earlier surveillance.
3. The extended period of operation will end in the 63rd year from the date of initial tensioning.

TABLE 4.5-4 HOOP TENDON DATA

Surveillance No.	Tendon	Years Since Initial Tensioning	Measured Force/ Tendon	Computed Value
1	13H10	3.17	1524	1549
	13H19	3.17	1485	1549
	13H37	3.17	1606	1549
	13H47	3.17	1606	1549
	62H9	3.17	1574	1549
	46H21*	3.17	1502	1549
	46H29	3.17	1463	1549
	46H31	3.17	1457	1549
	46H46	3.17	1464	1549
	51H11	3.17	1474	1549
2	13H22	5.46	1572	1508
	13H32	5.46	1611	1508
	13H43	5.46	1583	1508
	35H24	5.46	1533	1508
	35H28	5.46	1430	1508
	35H44	5.46	1622	1508
	46H42	5.46	1548	1508
	51H10	5.46	1572	1508
	51H23	5.46	1528	1508
	51H37	5.46	1567	1508
3	13H19	6.739	1424	1493 (Note 1)
	13H46	6.592	1546	1495
	35H35	6.786	1328	1493
	35H40	6.608	1458	1495
	42H20	6.614	1544	1494
	42H40	6.636	1466	1494
	46H10	6.678	1478	1494
	51H26*	6.569	1424	1495
	51H45	6.792	1492	1492
	62H34	6.617	1546	1494
4	13H20	12.575	1456	1447
	13H40	12.606	1471	1447
	51H26*	12.608	1411	1447
	51H41	12.817	1362	1446
	64H19	12.728	1470	1446

TABLE 4.5-4 (continued) HOOP TENDON DATA

Surveillance No.	Tendon	Years since Initial Tensioning	Measured Force/ Tendon	Extrapolated Value
5	35H01	18.942	1572	1417
	42H01	18.928	1560	1417
	46H21*	18.833	1425	1417 (Note 1)
	46H28	18.728	1375	1418
	46H29	18.769	1300	1418 (Note 1)
	46H30	18.781	1382	1418
	46H47	18.817	1468	1418
	62H08	18.814	1435	1418
6	42H18	22.692	1476	1404
	42H29	22.786	1448	1403
	42H30	22.733	1389	1404
	42H31	22.775	1338	1404
	42H32	22.703	1356	1404
	42H33	22.772	1361	1404
	42H35	22.733	1296.5	1404
	42H36	22.781	1408	1403
	42H37	22.744	1401.5	1404
	42H44	22.711	1471.5	1404
	51H25	22.822	1363	1403
	51H26*	22.628	1320	1404
	51H27	22.836	1265.5	1403
	51H28	22.647	1450.5	1404
	53H02	22.797	1611	1403
	53H46	22.667	1560	1404
	62H41	22.797	1426	1403
	62H46	22.736	1485	1404
7	46H21*	26.656	1388	1392
	46H30	26.694	1356	1392
	46H31	26.667	1343	1392
	46H32	26.628	1367	1392
	46H33	26.664	1358	1392
	46H34	26.619	1425	1392
	46H35	26.653	1377	1392
	46H36	26.608	1344	1392
	46H37	26.644	1293	1392

TABLE 4.5-4 (continued) HOOP TENDON DATA

Surveillance No.	Tendon	Years since Initial Tensioning	Measured Force/ Tendon	Extrapolated Value
7 (continued)	46H38	26.625	1353	1392
	46H39	26.647	1356	1392
	53H16	26.628	1475	1392
	63H02	26.672	1552	1392
	63H09	26.814	1432	1391
8	13H33	32.817	1306	1377
	13H34	32.636	1368	1377
	13H35	32.814	1244	1377
	13H36	32.622	1385	1377
	13H37	32.825	1289	1377
	13H38	32.639	1395	1377
	42H46	32.692	1558	1377
	46H19	32.711	1358	1377
	46H20	32.619	1298	1377
	46H21*	32.694	1330	1377
	46H22	32.622	1311	1377
	46H23	32.708	1329	1377
	46H24	32.636	1425	1377
	51H34	32.644	1464	1377
	62H29	32.736	1369	1377
	62H30	32.681	1290	1377
	62H31	32.739	1269	1377 (Note 2)
	62H32	32.689	1332	1377 (Note 2)
	62H33	32.733	1313	1377
	62H34	32.686	1378	1377
Extrapolated		63 (Note 3)		1329

*Control Tendon - Tendon 51H26 was used as the control tendon when testing was performed during outages for surveillances 3, 4 and 6. Tendon 46H21 was used during online testing for surveillances 5, 7 and 8.

Notes:

1. This value was not used in the regression analysis as the tendon was retensioned in an earlier surveillance.
2. This value was not used in the regression analysis as the tendon was only tested on one end.
3. The extended period of operation will end in the 63rd year from the date of initial tensioning.

FIGURE 4.5-1 PROJECTED FORCE IN DOME TENDONS

Based on Regression Analysis Using Surveillance Data

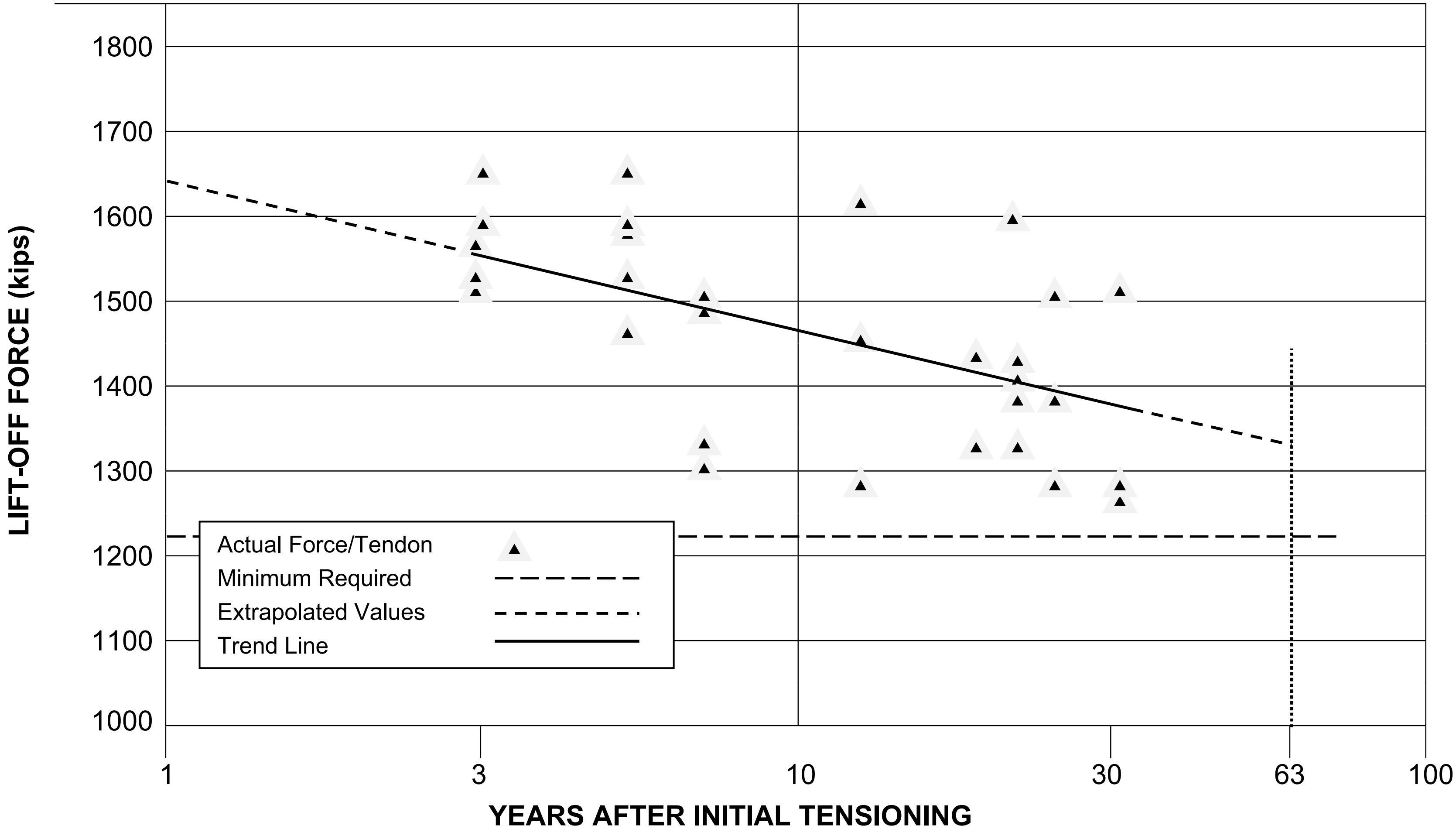


FIGURE 4.5-2 PROJECTED FORCE IN DOME CONTROL TENDON D212

Based on Regression Analysis Using Surveillance Data

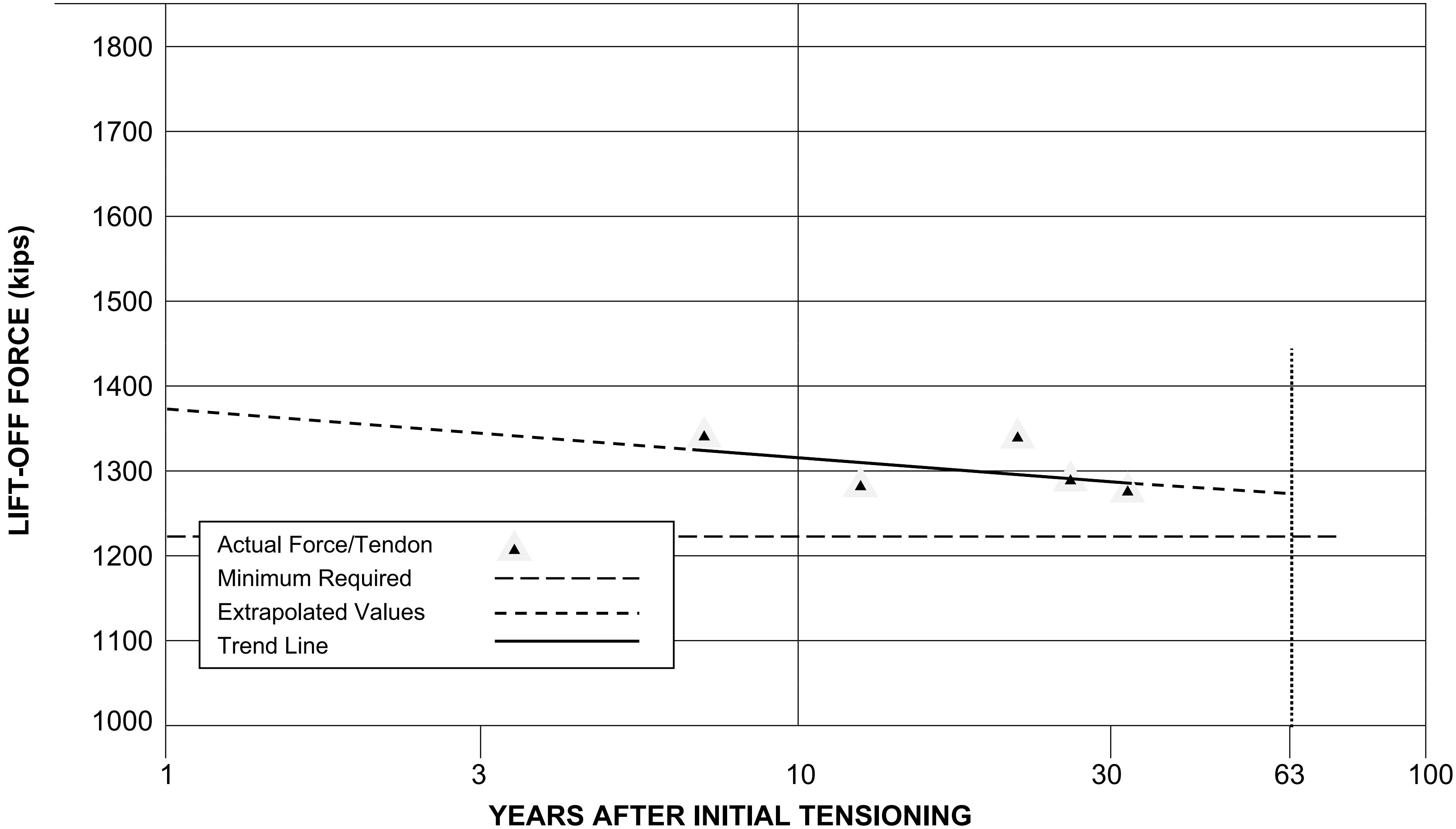


FIGURE 4.5-3 PROJECTED FORCE IN VERTICAL TENDONS

Based on Regression Analysis Using Surveillance Data

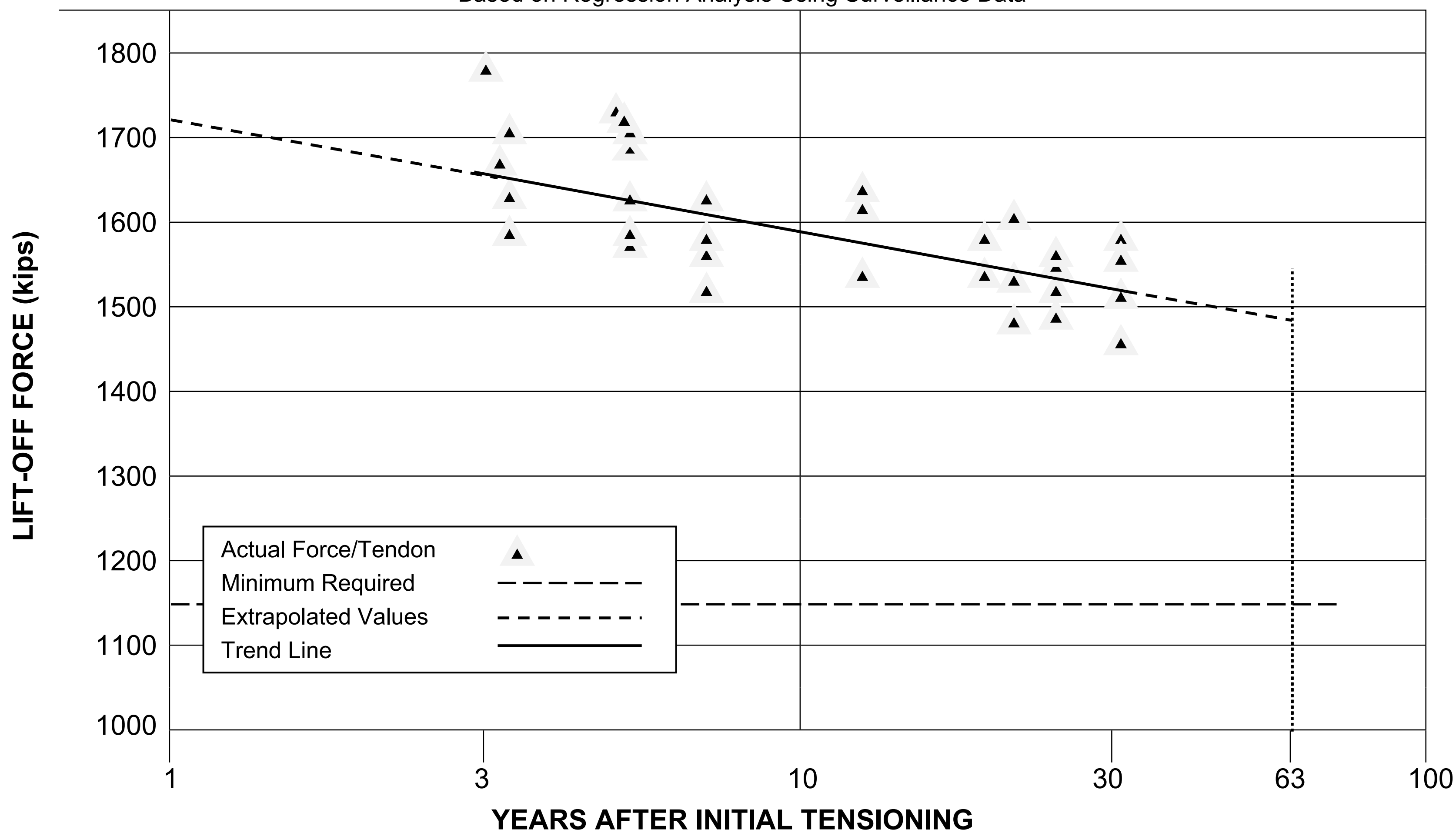


FIGURE 4.5-4 PROJECTED FORCE IN VERTICAL CONTROL TENDONS 61V08 AND 12V01

Based on Regression Analysis Using Surveillance Data

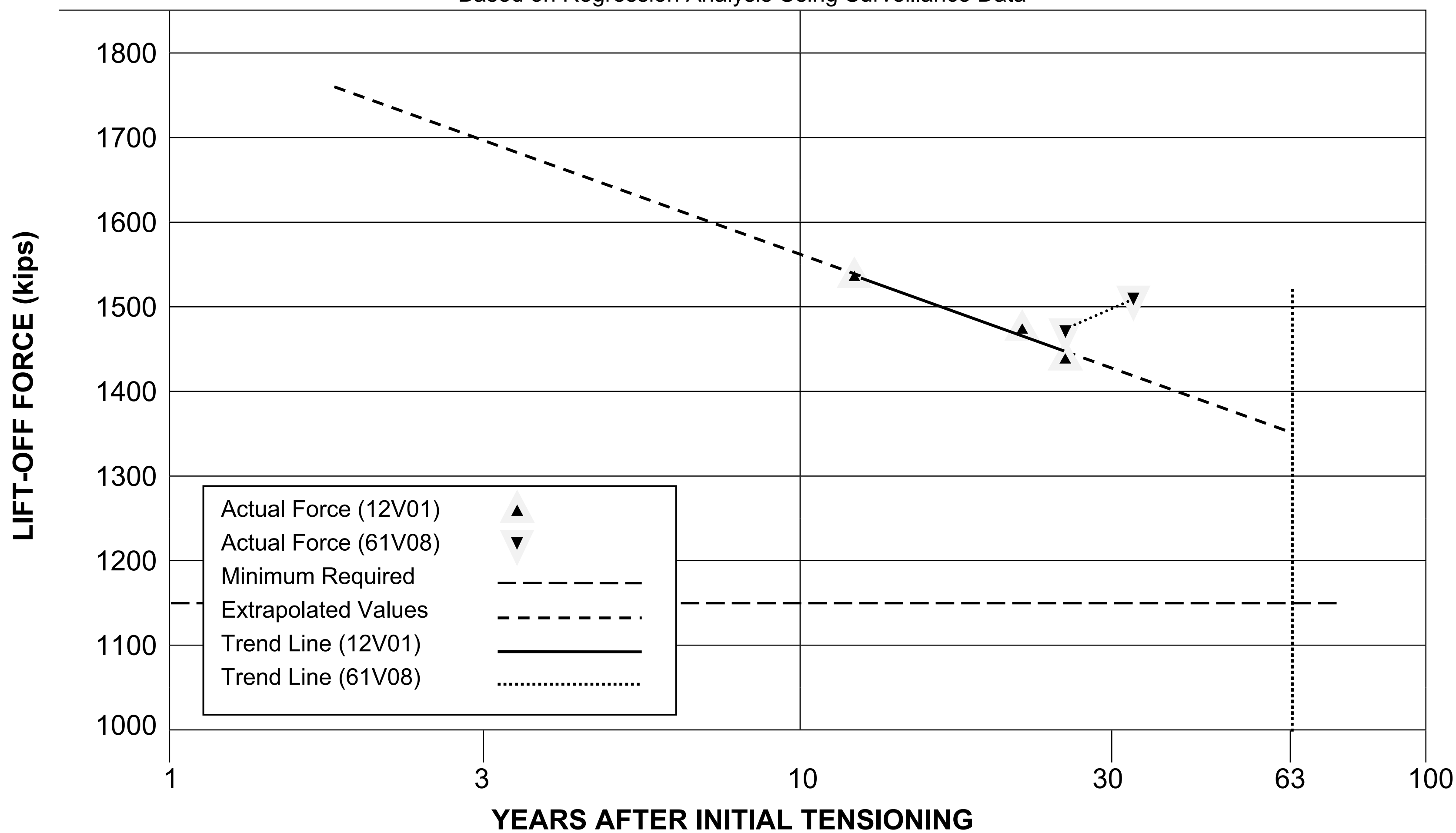


FIGURE 4.5-5 PROJECTED FORCE IN HOOP TENDONS

Based on Regression Analysis Using Surveillance Data

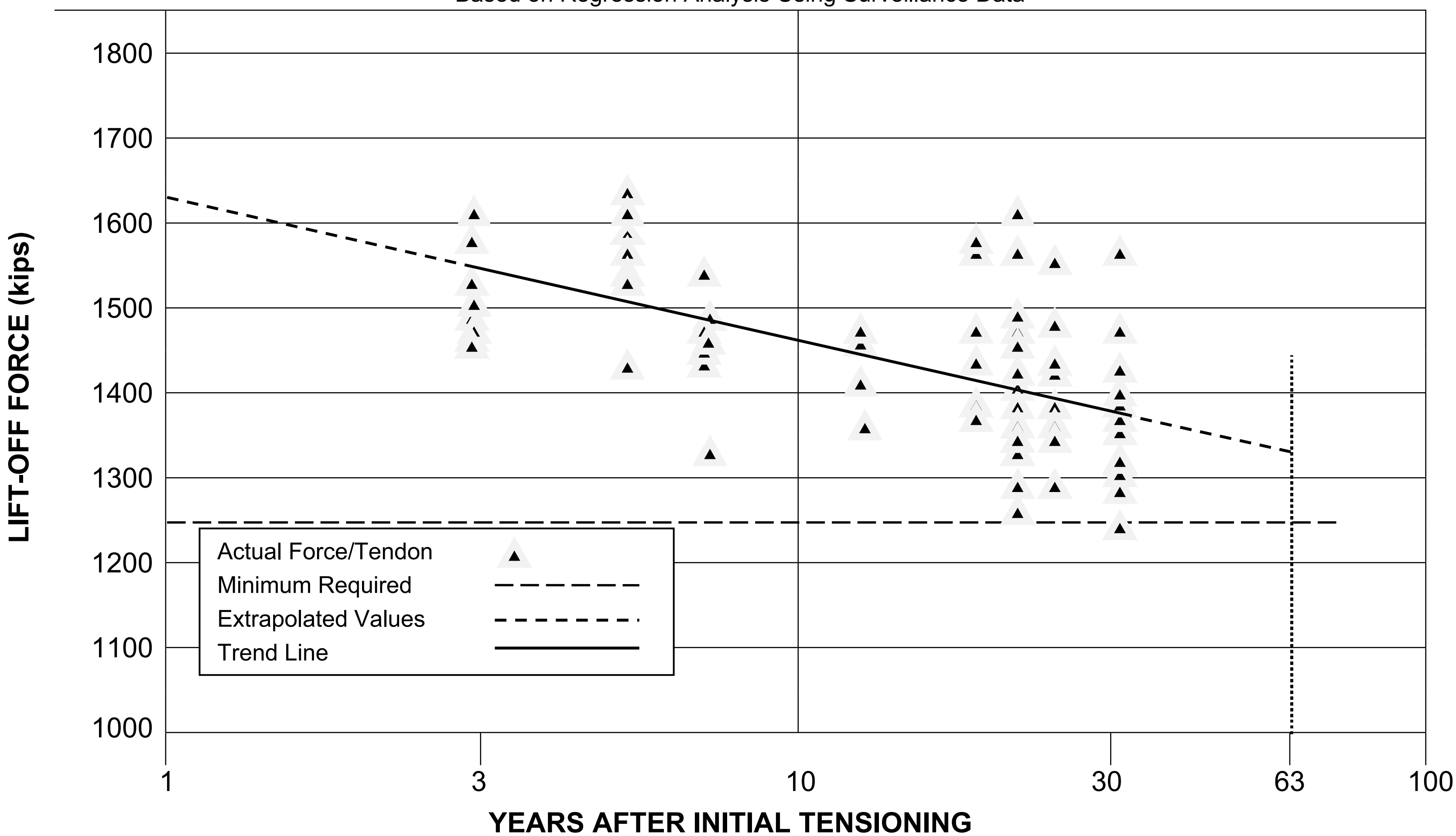
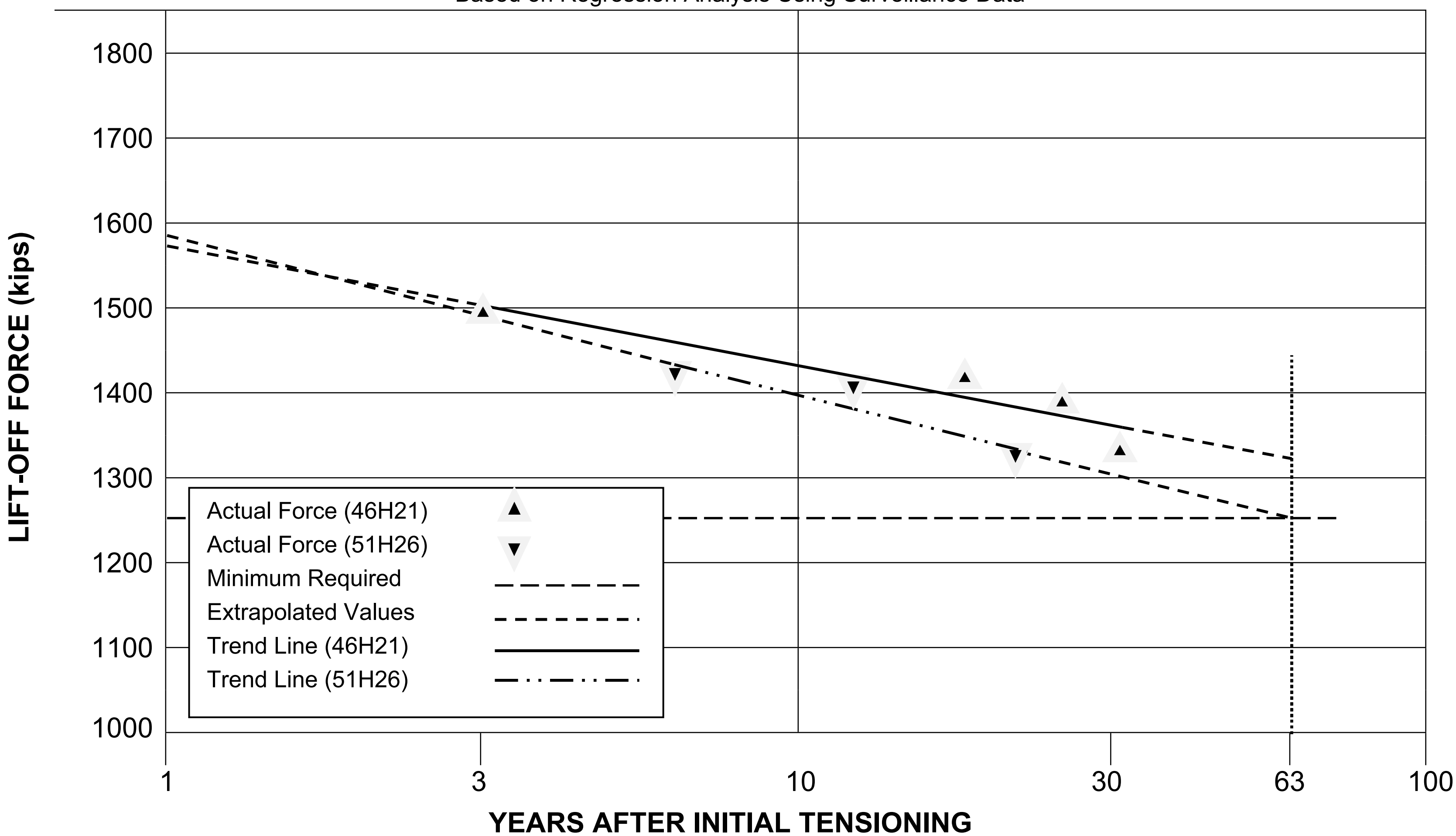


FIGURE 4.5-6 PROJECTED FORCE IN HOOP CONTROL TENDONS 51H26 AND 46H21

Based on Regression Analysis Using Surveillance Data



4.6 CONTAINMENT LINER PLATE, METAL CONTAINMENTS, AND PENETRATIONS FATIGUE ANALYSIS

4.6.1 FUEL TRANSFER TUBE EXPANSION BELLOWS CYCLES

Summary Description

The Fuel Transfer Tubes are essentially tubular passageways connecting the transfer canal in the Reactor Building with the Spent Fuel Pool in the Auxiliary Building. The Fuel Transfer Tube Expansion Bellows connect the Fuel Transfer Tubes to the Refueling Canal in the Reactor Building and to the Spent Fuel Pool in the Auxiliary Building. Per plant specifications, the Expansion Bellows shall be fabricated, as a minimum, to the requirements of Section VIII of the ASME Code and shall be inspected in accordance with the requirements of ASME Code, Section III, Class B vessels. Each Expansion Bellows is designed to withstand a total of 5,000 cycles of expansion and compression over a lifetime of 40 years. This TLAA addresses the requirement to ensure that the lifetime as described above may be extended to 60 years without exceeding the design criterion of 5,000 cycles.

Analysis

Expansion bellows cycles occur each refueling outage due to thermal cycling when the Fuel Transfer Tubes are flooded with refueling water then drained for return of the plant to operation. Assuming a period of mid-loop operation that involves a partial drain and refilling of the canal, bellows cycling would occur twice every refueling outage; however, cycling has been assumed to occur three times every refueling outage for additional conservatism. The number of cycles applied to the expansion bellows in the Reactor Building is assumed also to apply to the expansion bellows in the Auxiliary Building. There are 19 refueling outages planned for the 40-year life of the plant. The number of refueling outages over 60 years of life is 60/40 x 19 = 28.5 or 29 refueling outages. The maximum number of operating cycles projected to be experienced over the 29 refueling outages during a 60-year period is:

29 refueling outages x 3 cycles/refueling outage = 87 cycles.

Since the total number of expansion and compression cycles for the Fuel Transfer Tube Expansion Bellows is less than 5,000 cycles, no reanalysis of the design calculations is necessary. Therefore, an evaluation was performed as required by 10 CFR 54.21(c)(1) and was successful in demonstrating that the Fuel Transfer Tube Expansion Bellows design analyses of record remain valid for the period of extended operation.

Disposition: 10 CFR 54.21(c)(1)(i) – The qualification analyses for the Fuel Transfer Tube Expansion Bellows remain valid for the period of extended operation.

4.7 OTHER PLANT-SPECIFIC TIME-LIMITED AGING ANALYSES

4.7.1 ANALYSIS OF BEDROCK DISSOLUTION FROM GROUNDWATER

Summary Description

FSAR Section 2.5.3.4 documented a Bedrock Solutioning Study at CR-3. The solutioning process is the result of fresh water entering the underground areas below the plant and attacking the limestone sediments causing a destructive alteration of the carbonate rock leaving a labyrinth of channels throughout the rock mass. The purpose of the study was to determine the rate at which this solutioning process takes place and to establish the effect such a deleterious process would have upon the foundation of the CR-3 power plant during its 40-year life. The percent of rock dissolved over the 40-year life of the plant was calculated using different methods; and a determination was made that the percent of rock dissolved in accordance with these analyses represents an insignificant amount and that the small percentages of bedrock solutioning remain insignificant to the stability of the rock mass.

Analysis

One method presented in the FSAR determined that 1.5×10^{-5} % of the bedrock was dissolved over the forty year life of the plant. This was based on assuming the law of uniformitarianism was applicable and that 15% of the rock mass has been dissolved in 40 million years and definitely in more than 40,000 years. The 15% was based on the results of the exploratory and grout hole drilling at the site which indicated that the volume of solution channels was probably not greater than 15%. On this basis, the solution rate of the limestone was determined to be 15% per 40,000,000 years or approximately 3.75×10^{-7} % per year. In the 40-year life of the plant, 1.5×10^{-5} % could be expected to be dissolved. To extend this value to 60 years, the total maximum volume of dissolved bedrock was multiplied by the ratio of 60years/40years for an additional 20 years of extended life. Thus,

$$1.5 \times 10^{-5}\ \% \times 60/40 = 2.25 \times 10^{-5}\ \%.$$

In addition, the FSAR considered an extreme case by assuming that all of the 40-year solutioning has occurred during the last 10,000 years after the base level of the limestone formation was established as it essentially is today. This calculation produces the maximum solution rate. Assuming that only 10,000 years have been required for 15% of the rock mass to dissolve, the solution rate is 1.5×10^{-3} % per year. In a 40-year life of the plant, 6.0×10^{-2} % of the total volume would be dissolved. The FSAR determined that such a small percentage of solutioning would still be insignificant to the stability of the rock mass. To determine the percent dissolved during a 60-year plant life, this value was multiplied by the 60/40 ratio. Thus,

$$6.0 \times 10^{-2}\ \% \times 60/40 = 9.0 \times 10^{-2}\ \%.$$

It should be noted that this extreme case of reasoning for determining the percent of the rock dissolved at 40 years of plant life was not used in the conclusion for FSAR Section 2.5.3.4; and, therefore, the projection for this case was not used in this analysis.

Another method of evaluating bedrock dissolution is provided in the FSAR. This method determined that 4×10^{-3} % of the bedrock would be dissolved over the 40-year life of the plant. This was based on information obtained from the U.S. Geologic Survey for dissolved solids over a large land area that included the CR-3 site. Using this information it was determined that 764 lbs/day/mi^2 was dissolved. Comparing this to the actual area of the power plant resulted in 6.3 lbs per day of dissolved solids daily beneath the plant. This, in turn, results in 23 ft^3 of limestone per year dissolved from 23,040,000 ft^3 of rock based on limestone density of 100 lbs/ft^3 and assuming the solutioning occurs in the first 100 feet of depth beneath the ground surface. The conclusion of this analysis was that the solution rate was 1×10^{-4} % per year or 4×10^{-3} % for 40 years. For an additional 20 years of extended life, the total maximum volume of dissolved bedrock was determined by multiplying by 60/40:

$$4 \times 10^{-3} \% \times 60/40 = 6 \times 10^{-3} \%.$$

The conclusions of the 60-year projections based on the methods presented in FSAR Section 2.5.3.4 are that the range in percent of the rock dissolved would be between 2.25×10^{-5} % and 6×10^{-3} %. Dissolved volumes calculated by any of these methods still represent insignificant amounts. Further, the grouting process used in the foundation of Crystal River Units 2 and 3 reduced the permeability of the carbonate rocks from a figure in excess of 65,500 feet per year to less than 2,000 feet per year. With the permeability decreased by more than 30 times, exposure of the limestone to potential solvent groundwater is effectively reduced by the same factor. It is concluded that the natural solution process will not affect the structural integrity of the foundation of the power plant for the period of extended operation. Therefore, the analysis of the volume of bedrock solutioning from FSAR Section 2.5.3.4 has been projected to the end of the period of extended operation.

Disposition: **10 CFR 54.21(c)(1)(ii) – The analysis has been projected to the end of the period of extended operation.**

APPENDIX A

FINAL SAFETY ANALYSIS REPORT SUPPLEMENT

TABLE OF CONTENTS

A.0 FINAL SAFETY ANALYSIS REPORT SUPPLEMENT

This appendix provides the information to be submitted in a Final Safety Analysis Report Supplement as required by 10 CFR 54.21(d) for the CR-3 License Renewal Application. The License Renewal Application contains the technical information required by 10 CFR 54.21(a) and (c). Chapter 3 of the CR-3 License Renewal Application identifies the programs and activities that manage the effects of aging for the proposed period of extended operation, and Appendix B describes the programs and activities. Chapter 4 contains the evaluations of time-limited aging analyses for the period of extended operation. License Renewal Application Chapters 3 and 4 and Appendix B have been used to prepare the program and activity descriptions that are contained in this Appendix. The information presented here will be incorporated into the CR-3 FSAR following issuance of the renewed operating license.

A.1 NEW FSAR SECTION

The following information will be integrated into the FSAR to document aging management programs and activities credited in the CR-3 License Renewal review and time-limited aging analyses evaluated to demonstrate acceptability during the period of extended operation.

A.1.1 AGING MANAGEMENT PROGRAMS AND ACTIVITIES

The integrated plant assessment and evaluation of time-limited aging analyses (TLAA) identified existing and new aging management programs necessary to provide reasonable assurance that components within the scope of License Renewal will continue to perform their intended functions consistent with the current licensing basis (CLB) for the period of extended operation. This section describes the programs and their implementation activities.

Three elements common to all aging management programs are corrective actions, confirmation process, and administrative controls. These elements are included in the CR-3 Quality Assurance (QA) Program, which implements the requirements of 10 CFR 50, Appendix B.

In accordance with the guidance of NUREG-1801, “Generic Aging Lessons Learned (GALL),” Rev. 1, U.S. Nuclear Regulatory Commission, September 2005, regarding aging management of reactor vessel internals components for aging mechanisms, such as embrittlement and void swelling, CR-3 will: (1) participate in the industry programs for investigating and managing aging effects on reactor internals, (2) evaluate and implement the results of the industry programs as applicable to the reactor internals, and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.

In accordance with the guidance of NUREG-1801, regarding activities for managing the aging of nickel alloy and nickel-clad components susceptible to primary water stress corrosion cracking, CR-3 will comply with applicable NRC Orders and will implement: (1) applicable Bulletins and Generic letters, and (2) staff-accepted industry guidelines.

A.1.1.1 ASME Section XI, Inservice Inspection, Subsections IWB, IWC, and IWD Program

The American Society of Mechanical Engineers (ASME) Section XI, Inservice Inspection, Subsections IWB, IWC, and IWD Program is an existing program that consists of periodic volumetric, surface, and/or visual examinations of components for assessment, signs of degradation, and corrective actions. The Program for the Fourth

10-Year Inservice Inspection (ISI) interval at CR-3 will be implemented in accordance with Section XI of the ASME B&PV Code, 2001 Edition with addenda through 2003.

A.1.1.2 Water Chemistry Program

To mitigate aging effects on component surfaces that are exposed to water as a process fluid, chemistry programs are used to control water chemistry for impurities (e.g., dissolved oxygen, chloride, fluoride, and sulfate) that accelerate corrosion and cracking. The CR-3 Water Chemistry Program is an existing program that relies on monitoring and control of water chemistry to keep peak levels of various contaminants below the system-specific limits. Alternatively, chemical agents, such as corrosion inhibitors, oxygen scavengers, and biocides, may be introduced to prevent certain aging mechanisms. The CR-3 Water Chemistry Program is currently based on the latest version of the Electric Power Research Institute (EPRI) pressurized water reactor guidelines, "Pressurized Water Reactor Primary Water Chemistry Guidelines: Volume 1 and 2," and "Pressurized Water Reactor Secondary Water Chemistry Guidelines." The CR-3 Water Chemistry Program is updated as revisions to the guidelines are released.

A.1.1.3 Reactor Head Closure Studs Program

The CR-3 Reactor Head Closure Studs Program is an existing condition monitoring program which is implemented primarily through the CR-3 ASME Section XI Inservice Inspection Program. In addition, the Program includes certain preventive measures recommended by Regulatory Guide 1.65, "Material and Inspection for Reactor Vessel Closure Studs." This Program is credited for aging management of the Reactor Vessel Closure Head Stud Assembly (i.e., closure studs, nuts, and washers) for cracking due to stress corrosion cracking and loss of material due to wear.

Prior to the period of extended operation, the Reactor Head Closure Studs Program will be enhanced to select an alternate lubricant that is compatible with the fastener material and the contained fluid.

A.1.1.4 Boric Acid Corrosion Program

The Boric Acid Corrosion Program is an existing program that manages the aging effects for susceptible materials of structures and components that perform a License Renewal intended function and that are exposed to the effects of borated water leaks. The Program consists of: (1) visual inspection of external surfaces that are potentially exposed to borated water leakage, (2) timely discovery of leak path and removal of the boric acid residues, (3) assessment of the damage, and (4) follow-up inspection for adequacy of corrective actions. This Program is implemented in response to NRC Generic Letter 88-05.

The scope of the Boric Acid Corrosion Program includes components that may be susceptible to exposure to boric acid including mechanical, structural, and electrical components. The Boric Acid Corrosion Program includes plant-specific reactor coolant pressure boundary (RCPB) boric acid leakage identification and inspection procedures to ensure that leaking borated coolant does not lead to degradation of the leakage source or adjacent structures, and provides assurance that the RCPB will have an extremely low probability of abnormal leakage, rapidly propagating failure, or gross rupture.

A.1.1.5 Nickel-alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure heads of Pressurized Water Reactors Program

The Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors Program is an existing program that provides for the periodic inspection of the Reactor Pressure Vessel head and Vessel Head Penetration nozzles. This Program effectively manages the aging effect by identifying cracking in the upper penetration nozzles or the J-groove welds prior to loss of intended function. The required inspections are performed in the CR-3 ISI Program as augmented inspections.

A.1.1.6 Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program

The Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program is a new program that will manage loss of fracture toughness due to thermal aging and/or neutron irradiation embrittlement of CASS reactor vessel internals. This Program will be based upon the evaluation and inspection recommendations of NUREG-1801, Section XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)." The Program will effectively manage the aging effect to prevent loss of intended function.

A.1.1.7 Flow-Accelerated Corrosion Program

The Flow-Accelerated Corrosion (FAC) Program is an existing program that provides for prediction, inspection, and monitoring of carbon steel piping, valves, and fittings for loss of material due to FAC so that timely and appropriate action may be taken to minimize the probability of experiencing a FAC-induced leak or rupture. The FAC Program elements are based on the recommendations identified in NSAC-202L, “Recommendations for an Effective Flow-Accelerated Corrosion Program,” which require controls to assure the structural integrity of carbon steel lines containing high-energy fluids, both two-phase, as well as single-phase.

A.1.1.8 Bolting Integrity Program

The Bolting Integrity Program is an existing program that addresses aging management requirements for bolting on mechanical components within the scope of License Renewal. The CR-3 Bolting Integrity Program utilizes industry recommendations and

EPRI guidance that considers material properties, joint and gasket design, chemical control, service requirements, and industry and site operating experience in specifying torque and closure requirements. The Program relies on recommendations for a Bolting Integrity Program, as delineated in NUREG-1339, "Resolution of Generic Safety Issue 29: Bolting Degradation or Failure in Nuclear Power Plants," and industry recommendations, as delineated in EPRI reports NP-5769, “Degradation and Failure of Bolting in Nuclear Power Plants,” and TR-104213, “Bolted Joint Maintenance & Applications Guide,” for pressure retaining bolting within the scope of License Renewal. Bolting and closures inspections, monitoring and trending, and repair and replacement are performed under the ASME Section XI Inservice Inspection, Subsections IWB, IWC and IWD Program and External Surfaces Monitoring Program requirements, as applicable. The Program includes periodic inspection of high-strength structural bolting for cracking. Degraded conditions are also subject to the Corrective Action Program. The Structures Monitoring Program and the ASME Section XI Inservice Inspection, Subsection IWF Program are credited for aging management of structural bolting.

Prior to the period of extended operation, Program administrative control documents will be enhanced to include: (1) guidance for torquing and closure requirements based on the EPRI documents endorsed by NUREG-1801, (2) requirements to remove instances where molybdenum disulfide lubricant is allowed for use in bolting applications in specific procedures and to add a general prohibition against use of molybdenum disulfide lubricants for bolted connections, (3) guidance for torquing and closure requirements that include proper torquing of the bolts and checking for uniformity of gasket compression after assembly, (4) guidance for torquing and closure requirements based on the guidance of EPRI 5067, “Good Bolting Practices, A Reference Manual for Nuclear Power Plant Personnel,” Volumes I and II, (5) a centralized procedure based on EPRI-5067 containing guidance regarding bolted joint leak tightness and pre-installation inspections consistent with the recommendations of that document, (6) periodic examinations of a representative sample of bolting identified as potentially having actual yield strength >150 ksi for SCC consisting of periodic in situ ultrasonic testing or, alternatively, surface examination or bolt replacement, (7) examination of NSSS support high strength bolting for SCC concurrent with examinations of the associated supports at least once per 10-year ISI period, and (8) acceptance standards for examination of high strength structural bolting consistent with the recommendations of EPRI NP-5769 or application specific structural analyses.

A.1.1.9 Steam Generator Tube Integrity Program

The Steam Generator Tube Integrity Program is an existing program credited for aging management of the tubes, tube plugs, sleeves, tube supports, and the secondary-side components whose failure could prevent the steam generator from fulfilling its intended safety function for the period of extended operation. The Steam Generator Tube Integrity Program is based on an existing program, the Steam Generator Integrity Program that has been established to meet the intent of the Steam Generator Program guidance in Nuclear Energy Institute (NEI) 97-06, “Steam Generator Program

Guidelines," Revision 2. The Steam Generator Integrity Program is based on Technical Specification requirements and NEI 97-06.

A.1.1.10 Open-Cycle Cooling Water System Program

The Open Cycle Cooling Water System Program is an existing program that addresses the aging effects of material loss, flow blockage, and reduction in heat transfer due to micro- or macro-organisms and various corrosion mechanisms in raw water piping systems. This Program was originally developed in response to NRC Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment." The Program includes monitoring, inspecting, and testing to verify that Nuclear Services and Decay Heat Seawater System aging effects can be managed and that the system can perform its intended safety related functions.

The Program will be enhanced to: (1) include the Nuclear Services and Decay Heat Seawater System Pumps in a periodic inspection and/or rebuild program. This Program will be initiated during the current license period and inspect one or more pumps prior to the period of extended operation, (2) subject the Nuclear Services and Decay Heat Seawater System Discharge Conduits to inspection and evaluation subsequent to the SG replacement project, but prior to the period of extended operation, in order to determine the extent of activities required during the period of extended operation to support the intended function of these components, and (3) establish periodic maintenance activities for Nuclear Services and Decay Heat Seawater System expansion joints prior to the period of extended operation.

A.1.1.11 Closed-Cycle Cooling Water System Program

The Closed-Cycle Cooling Water System Program is an existing program that addresses aging management of components in CR-3 conventional closed-cycle cooling water systems, diesel engine jacket water systems, and chilled water systems. These systems are closed cooling loops with controlled chemistry, consistent with the NUREG-1801 description of a closed-cycle cooling water system. These systems employ an effective chemistry program augmented by component testing and inspection based on EPRI Closed Cooling Water Chemistry Guidelines to assure License Renewal intended functions are maintained.

A.1.1.12 Inspection of Overhead Heavy Load and Light Load Handling Systems Program

The Inspection of Overhead Heavy Load and Light Load Handling Systems Program is an existing program that manages the aging effects of corrosion of structural components and wear of rails for the following cranes:

Structure	Crane(s)
Reactor Building	RB Polar Crane Reactor Vessel Tool Handling Jib Crane 5-Ton Jib Crane CRDM Jib Crane Main Fuel Handling Bridge Crane
Auxiliary Building	120-Ton Fuel Handling Area Crane Spent Fuel Pit Missile Shield Crane Spent Fuel Pool Handling Bridge Crane
EFW Pump Building	EFW Pump Building 3-Ton Crane
Circulating Water Intake Structure	Intake Gantry Crane

Administrative controls for the Program will be enhanced, prior to the period of extended operation to: (1) include in the Program all cranes within the scope of License Renewal; (2) require the responsible engineer to be notified of unsatisfactory crane inspection results involving loss of material; (3) specify the frequency of inspections for the cranes within the scope of License Renewal to be every refueling outage for cranes in the RB and every two years for cranes outside the RB; and (4) clarify that crane rails are to be inspected for abnormal wear and that members to be inspected for cracking include welds.

A.1.1.13 Fire Protection Program

The CR-3 Fire Protection Program is an existing program credited for aging management of fire protection components including penetration seals; expansion joints; fire barrier walls, ceilings, and floors; fire rated doors; Diesel Fire Service Pump fuel oil supply lines; fire barrier assemblies, such as, fire wraps on trays, pipes, and conduits; and the Halon system used for the Control Complex cable spreading room.

Prior to the period of extended operation, the Program administrative controls will be enhanced to: (1) include specific guidance for periodic inspection of fire barrier walls, ceilings, and floors including a requirement to notify Fire Protection of any deficiencies having the potential to adversely affect the fire barrier function; (2) include additional inspection criteria as described in NUREG-1801 for penetration seals; (3) include additional inspection criteria for corrosion of fire doors; and (4) specify minimum qualification requirements for personnel performing visual inspections of penetrations seals and fire doors.

A.1.1.14 Fire Water System Program

The Fire Water System Program is an existing program that includes system pressure monitoring, wall thickness evaluations, periodic flow and pressure testing in accordance with applicable National Fire Protection Association (NFPA) commitments, and periodic visual inspection of overall system condition. These activities provide an effective means to determine whether corrosion and biofouling are occurring. Inspections of the sprinkler heads assure that corrosion products that could block flow are not accumulating. These measures will allow timely corrective action in the event of system degradation to ensure the capability of the water-based Fire Suppression System to perform its intended functions.

Prior to the period of extended operation, the Program will be enhanced to:
(1) incorporate a requirement to perform one or a combination of the following two activities: (a) Implement periodic flow testing consistent with the intent of NFPA 25, or (b) Perform wall thickness evaluations to verify piping is not impaired by pipe scale, corrosion products, or other foreign maternal. For sprinkler systems, this may be done by flushing, internal inspection by removing one or more sprinkler heads, or by other obstruction investigation methods, (such as technically proven ultrasonic and X-ray examination) that have been evaluated as being capable of detecting obstructions. (These inspections will be performed before the end of the current operating term. The results from the initial inspections will be used to determine inspection intervals thereafter during the period of extended operation.), (2) perform internal inspections of system piping at representative locations as required to verify that loss of material due to corrosion has not impaired system intended function. Alternately, non-intrusive inspections (e.g., ultrasonic testing) can be used to verify piping integrity. (These inspections will be performed before the end of the current operating term. The results from the initial inspections will be used to determine inspection intervals thereafter during the period of extended operation.), (3) incorporate a requirement to perform a visual inspection of yard fire hydrants annually consistent with the intent of NFPA 25 to ensure timely detection of signs of degradation, such as corrosion, and (4) consistent with the intent of NFPA 25, either replace the sprinkler heads prior to reaching their 50-year service life or revise site procedures to perform field service testing, by a recognized testing laboratory, of representative samples from one or more sample areas. (Subsequent test intervals will be based on test results.)

A.1.1.15 Aboveground Steel Tanks Program

The Aboveground Steel Tanks Program is a new program that will manage the aging effect of loss of material by performing inspections of the Fire Service Water Storage Tanks and the Condensate Storage Tank. The Program includes measures to monitor corrosion or degradation by observing the external surface of tanks, which have a protective coating, and the seal at the concrete foundation. Only carbon steel tanks are included. Monitoring of the tanks includes periodic walkdown inspections and planned preventive maintenance activities. Volumetric examinations of tank bottoms will also be performed. These actions will provide reasonable assurance that the tanks will perform their intended function consistent with the CLB throughout the period of extended operation.

A.1.1.16 Fuel Oil Chemistry Program

The Fuel Oil Chemistry Program is an existing program that maintains fuel oil quality by the purchase of quality fuel and the establishment of a diesel fuel oil testing program for both new and stored fuel oil. The Program includes sampling and testing requirements and acceptance criteria in accordance with applicable American Society for Testing Materials (ASTM) Standards specified in the CR-3 Technical Specification surveillance requirements and chemistry program procedures for fuel oil testing. Exposure to fuel oil contaminants, such as water and microbiological organisms, is minimized by verifying the quality of new oil and the addition of a biocide, a stabilizer, and corrosion inhibitors. Continued quality levels are assured by periodically checking for and removing water from tanks and by sampling to confirm that the bulk properties of water, sediment, particulate contamination, and biological growth are within administrative target values or Technical Specification limits. The effectiveness of the Program is verified using visual inspections of tanks to ensure that significant degradation is not occurring and that the component intended function will be maintained during the extended period of operation.

Prior to the period of extended operation, the Program will be enhanced to: (1) adjust the inspection frequency for the Diesel-Driven Emergency Feedwater Pump Fuel Oil Storage Tank to ensure an inspection is performed prior to the period of extended operation, (2) inspect the internal surfaces of the Diesel-Driven Fire Pump Fuel Oil Storage Tanks, and (3) develop a work activity to periodically inspect the internal surfaces of the Diesel-Driven Fire Pump Fuel Oil Storage Tanks.

A.1.1.17 Reactor Vessel Surveillance Program

The Reactor Vessel Surveillance Program is an existing program that manages the reduction of fracture toughness of the reactor vessel beltline materials due to neutron embrittlement. The Program fulfills the intent and scope of 10 CFR 50, Appendix H, by participation in the Master Integrated Reactor Vessel Surveillance Program (MIRVP) and by maintaining a fluence monitoring program. The Program evaluates neutron embrittlement by projecting upper shelf energy and pressurized thermal shock reference temperatures for reactor materials with projected neutron exposure greater than 10^{17} n/cm^2 (E > 1.0 MeV) after 60 years of operation and by the development of pressure-temperature limit curves. Embrittlement information is obtained in accordance with NRC Regulatory Guide 1.99, Revision 2, chemistry tables and with surveillance capsules, which have provided credible data for both the current operating period and for the period of extended operation. The surveillance program design, capsule withdrawal schedule, and evaluation of test results are in accordance with ASTM E 185-82.

Prior to the period of extended operation, the Program will be enhanced to: (1) ensure that neutron exposure conditions of the reactor vessel remain bounded by those used to project the effects of embrittlement to the end of the 60-year extended license period and (2) establish formalized controls for the storage of archived specimens to ensure availability for future use by maintaining the identity, traceability, and recovery of the archived specimens throughout the storage period.

A.1.1.18 One-Time Inspection Program

The One-Time Inspection Program is a new aging management program that employs one-time inspections to verify the effectiveness of other aging management programs or to confirm the slow progression, or the absence of, an aging effect. The Program scope includes the Water Chemistry Program, ASME Section XI Inservice Inspection Program, Fuel Oil Chemistry Program, and Lubricating Oil Analysis Program verifications specified by NUREG-1801, as well as plant-specific inspections. The Program will be completed by the addition of procedural controls for implementation and tracking.

A.1.1.19 Selective Leaching of Materials Program

The Selective Leaching of Materials Program is a new program that includes one-time inspections and qualitative determinations of the presence of selective leaching in potentially susceptible components. A sample population of susceptible components will be selected for the inspections prior to commencing the period of extended operation. The inspections will determine whether loss of material due to selective leaching is occurring, and whether the process will affect the ability of the components to perform their intended function(s) for the period of extended operation. This Program includes an exception to the corresponding program described in NUREG-1801 involving the use of qualitative determinations, other than Brinell hardness testing, to identify the presence of selective leaching.

A.1.1.20 Buried Piping and Tanks Inspection Program

The Buried Piping and Tanks Inspection Program is a new program that manages the aging effect of loss of material for the external surfaces of buried steel piping components and tanks in CR-3 systems within the scope of License Renewal. The Program includes preventive measures to mitigate corrosion by protecting the external surface of buried components through use of coating or wrapping. The Program also includes visual examination of buried piping components made accessible by excavation. Program administrative controls to be developed include ensuring an appropriate as-found pipe coating and material condition inspection is performed whenever buried piping within the scope of this Program is exposed, with a minimum frequency of at least one buried piping inspection every 10 years; verifying that there is at least one opportunistic or focused inspection performed within the ten year period prior to the period of extended operation; specifying that an inspection datasheet will be used; requiring inspection results to be documented; including precautions concerning excavation and use of backfill for License Renewal piping and tanks, including a requirement that buried pipe and tank coating inspection shall be performed, when excavated, by qualified personnel to assess its condition; and including a requirement that a coating engineer or other qualified individual should assist in evaluation of any pipe and tank coating damage or degradation found during the inspection.

A.1.1.21 One-Time Inspection of ASME Code Class 1 Small-Bore Piping

The CR-3 One-Time Inspection of ASME Code Class 1 Small-Bore Piping Program is a new program that will manage cracking in small-bore (less than NPS 4) Class 1 piping through the use of a combination of volumetric examinations and visual inspections. The Program will manage the aging effect through the identification and evaluation of cracking in small-bore Class 1 piping. Any cracking identified in small-bore Class 1 piping resulting from stress corrosion or thermal and mechanical loading will result in periodic inspections to be managed by a plant-specific program. The Program will effectively manage the aging effect by identifying and evaluating cracking in small-bore Class 1 piping prior to loss of intended function.

A.1.1.22 External Surfaces Monitoring Program

The External Surfaces Monitoring Program is an existing program based on system inspections and walkdowns. The Program consists of periodic visual inspections of components such as piping, piping components, ducting, and other equipment within the scope of License Renewal and subject to aging management review in order to manage aging effects.

Prior to the period of extended operation, the Program will be enhanced to: (1) ensure that the Program encompasses all of the systems and components that credit it for aging management, (2) include inspection attributes adequate for detecting aging effects and mechanisms and for characterizing degradation consistent with the expected degradation of the systems and components crediting the Program for aging management, (3) incorporate measures to assure the integrity of surfaces that are inaccessible or not readily visible during both plant operations and refueling outages, and (4) incorporate inspection attributes for degradation of coatings.

A.1.1.23 Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program is a new program that relies upon work order tasks that provide opportunities for the visual Inspection of internal surfaces of piping and ducting components. Work task activities will monitor parameters that may be detected by visual inspection and include change in material properties, cracking, flow blockage, hardening, loss of material, and reduction of heat transfer effectiveness. In addition to visual inspection of internal surfaces, the Program includes a limited scope of preventive maintenance activities that involve 1) physical manipulation or other investigative methods to detect aging effects and 2) inspection of outside surfaces. The extent and schedule of inspections and testing assure detection of component degradation prior to loss of intended functions.

A.1.1.24 Lubricating Oil Analysis Program

The Lubricating Oil Analysis Program is an existing program that maintains lubricating oil quality by periodic sampling for contamination in accordance with site program procedures. Exposure to contaminants, such as water and particulates, is minimized by monitoring the lube oil quality and taking corrective action when monitored parameters trend toward unacceptable or administrative limits. The program also implements periodic oil changes at fixed intervals for selected components. A particle count and check for water are performed on the old oil prior to disposal to detect evidence of abnormal wear rates, contamination by moisture, or excessive corrosion. The Program has proven effective at managing the aging effects for components exposed to lubricating oil.

A.1.1.25 ASME Section XI, Subsection IWE Program

The ASME Section XI, Subsection IWE Program is an existing program used for the aging management of accessible and inaccessible pressure retaining Containment Structure Class MC components. This Program is implemented in accordance with ASME Section XI, Subsection IWE, 2001 Edition, through the 2003 Addenda, as modified by 10CFR50.55a.

A.1.1.26 ASME Section XI, Subsection IWL Program

The ASME Section XI, Subsection IWL Program is an existing program used for the aging management of the reinforced concrete and the unbonded post-tensioning system of the CR-3 Class CC containment structure. This Program is implemented in accordance with 10 CFR 50.55(a) and ASME Section XI, Subsection IWL, 2001 Edition, through the 2003 Addenda.

A.1.1.27 ASME Section XI, Subsection IWF Program

The ASME Section XI, Subsection IWF Program consists of periodic visual examination of component supports for loss of material, change in material properties, and loss of mechanical function. The Program is an existing program implemented through plant procedures, which provide for visual examination of ISI Class 1, 2, and 3 supports. The CR-3 Program for component and pipe supports is in accordance with the requirements of ASME Section XI, Subsection IWF: 2001 Edition through the 2003 Addenda.

A.1.1.28 10 CFR 50, Appendix J Program

The 10 CFR 50, Appendix J Program is an existing program that consists of monitoring leakage rates through the containment pressure boundary, including penetrations and access openings. Containment leak rate tests assure that leakage through the primary containment, and systems and components penetrating the primary containment do not exceed the allowable leakage limits specified within the CR-3 Technical Specifications. Corrective actions are taken if leakage rates exceed established administrative limits for individual penetrations or the overall containment pressure boundary. Seals and gaskets are also monitored under the program.

The CR-3 10 CFR 50, Appendix J Program utilizes the performance-based approach of 10 CFR 50 Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors" Option B, and includes appropriate guidance from Regulatory Guide 1.163, September 1995, "Performance-Based Containment Leak-Test Program," as modified by NEI 94-01, “Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50 Appendix J.”

A.1.1.29 Masonry Wall Program

The CR-3 Masonry Wall Program is an existing program designed to manage the aging effects of masonry walls. For License Renewal, the Program will assure that the evaluation basis established for each masonry wall within the scope of License Renewal remains valid through the period of extended operation. The Program includes masonry walls identified as performing License Renewal intended functions within the Auxiliary Building, Control Complex, Turbine Building, Fire Service Pumphouse, and the Switchyard Relay Building. The Program is a condition monitoring program with the inspection frequencies established such that no loss of intended function would occur between inspections.

Prior to the period of extended operation, Program administrative controls will be enhanced to identify the structures that have masonry walls in the scope of License Renewal.

A.1.1.30 Structures Monitoring Program

The Structures Monitoring Program consists of periodic inspection and monitoring of the condition of structures and component supports to ensure that aging degradation leading to loss of intended functions will be detected and that the extent of degradation can be determined. This Program is an existing program that is implemented in accordance with the Maintenance Rule, 10 CFR 50.65; NEI 93-01, "Industry Guidelines for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," and Regulatory Guide 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants." The inspection criteria are based on American Concrete Institute Standard, ACI 349.3R-96, "Evaluation of Existing Nuclear Safety-Related Concrete Structures;" and American Society of Civil Engineers, ASCE 11-90, "Guideline for Structural Condition Assessment of Existing Buildings;" as well as, Institute for Nuclear Power Operations (INPO) Good Practice document 85-033, "Use of System Engineers;" and NEI 96-03, "Guidelines for Monitoring the Condition of Structures at Nuclear Plants."

Prior to the period of extended operation, the Structures Monitoring Program will be enhanced by revising the administrative controls that implement the Program to: (1) identify all License Renewal structures and systems that credit the Program for aging management in the corporate procedure for condition monitoring of structures, (2) require notification of the responsible engineer when below grade concrete including concrete pipe is exposed so an inspection may be performed prior to backfilling, (3) require periodic groundwater chemistry monitoring including consideration for potential seasonal variations, (4) require periodic inspections of the water control structures, i.e., Circulating Water Intake Structure, Circulating Water Discharge Structure, Nuclear Service Sea Water Discharge Structure, Intake Canal, and Raw Water Pits, on a frequency not to exceed five years, (5) require periodic inspections of the Circulating Water Intake Structure submerged portions on a frequency not to exceed five years, (6) identify additional civil/structural commodities and associated inspection attributes and performance standard required for License Renewal in the corporate procedure for condition monitoring of structures, (7) identify additional inspection criteria for structural commodities in the site system walkdown checklist, (8) add inspection for corrosion to the inspection criteria for the bar racks at the Circulating Water Intake Structure as a periodic maintenance activity, (9) add an inspection of the earth for loss of form and loss of material for the Wave Embankment Protection Structure as a periodic maintenance activity, (10) include additional in-scope structures and specific civil/structural commodities in periodic maintenance activities, and (11) require periodic inspections of the Fluorogold slide bearing plates used in structural steel platform applications in the Reactor Building.

A.1.1.31 Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is a new program credited for the aging management of cables and connections not included in the CR-3 Environmental Qualification (EQ) Program. Under this Program, accessible electrical cables and connections installed in adverse localized environments are visually inspected at least once every 10 years for cable and connection jacket surface anomalies, such as embrittlement, discoloration, cracking, swelling, or surface contamination, which are precursor indications of conductor insulation aging degradation from heat, radiation or moisture. An adverse localized environment is a condition in a limited plant area that is significantly more severe than the specified service condition for the electrical cable or connection.

A.1.1.32 Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program is a new program credited for the aging management of radiation monitoring and nuclear instrumentation cables not included in the CR-3 EQ Program. Exposure of electrical cables to adverse localized environments caused by heat, radiation, or mositure can result in reduced insulation resistance (IR). A reduction in IR is a concern for circuits with sensitive high voltage, low-level signals such as radiation monitoring and nuclear instrumentation circuits since it may contribute to signal inaccuracies. For radiation monitoring circuits and Gamma Metrics circuits, the review of calibration results or findings of surveillance testing will be used to identify the potential existence of cable system aging degradation. This review will be performed at least once every 10 years, with the first review to be completed before the end of the current license term. Power range cable systems used in the Excore Monitoring System will be tested at a frequency not to exceed 10 years based on engineering evaluation, with the first testing to be completed before the end of the current license term. Testing may include IR tests, time domain reflectometry tests, current versus voltage testing, or other testing judged to be effective in determining cable system insulation condition.

A.1.1.33 Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program

The Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is a new program credited for the aging management of cables not included in the CR-3 EQ Program. In-scope, medium-voltage cables exposed to significant moisture and significant voltage are tested at least once every 10 years to provide an indication of the condition of the conductor insulation. The specific type of test performed will be determined prior to the initial test, and is to be a proven test for detecting deterioration of the insulation system due to wetting, such as power factor, partial discharge, or polarization index, or other testing that is state-of-the-art at the time the test is performed. Significant moisture is defined as periodic exposures that last more than a few days (e.g., cable in standing water). Periodic exposures that last less than a few days (e.g., normal rain and drain) are not significant. Significant voltage exposure is defined as being subjected to system voltage for more than 25% of the time. Manholes associated with inaccessible non-EQ medium-voltage cables will be inspected for water accumulation and drained, as needed. The manhole inspection frequency will be based on actual field data and shall not exceed two years.

A.1.1.34 Metal Enclosed Bus Program

The Metal Enclosed Bus Program is a new program credited for the aging management of non-segregated 4.16KV and 250/125VDC Metal Enclosed Bus within the scope of

License Renewal. The Program involves various activities conducted at least once every 10 years to identify the potential existence of aging degradation. In this Program, a sample of accessible bolted connections will be checked for loose connection by using thermography or by measuring connection resistance using a low range ohmmeter. In addition, the internal portions of the bus enclosure will be visually inspected for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of moisture intrusion. The bus insulation will be visually inspected for signs of embrittlement, cracking, melting, swelling, or discoloration, which may indicate overheating or aging degradation. The internal bus supports will be visually inspected for structural integrity and signs of cracks. As an alternative to thermography or measuring connection resistance of bolted connections, for the accessible bolted connections that are covered with heat shrink tape, sleeving, insulating boots, etc., visual inspection of the insulation material may be used to detect surface anomalies, such as discoloration, cracking, chipping or surface contamination. If this alternative visual inspection is used to check bolted connections, the first inspection will be completed before the period of extended operation and every five years thereafter.

A.1.1.35 Fuse Holder Program

The Fuse Holder Program is a new program credited for aging management of fuse holders that are susceptible to aging effects and are located outside of active devices. Fuse holders inside active devices, such as switchgear, power supplies, power inverters, battery chargers, control panels and circuit boards are not within the scope of this Program. The Program focuses on the metallic clamp (or clip) portion of the fuse holder. The parameters monitored include corrosion and oxidation. Identified fuse holders within the scope of License Renewal will be tested at least once every 10 years. Testing may include thermography, contact resistance testing, or other appropriate testing (to be determined prior to implementation). The first test for license renewal will be completed before the period of extended operation.

A.1.1.36 Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program

The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is a new program credited for the aging management of cable connections not included in the CR-3 EQ Program. The Program will be implemented as a one-time inspection on a representative sample of non-EQ cables connections within the scope of License Renewal prior to the period of extended operation to provide an indication of the integrity of the cable connection. The specific type of test performed will be determined prior to the test, and is to be a proven test for detecting loose connections, such as thermography, contact resistance testing, or other appropriate testing judged to be effective in determining cable connection integrity. The factors considered for sample selection are application (high, medium and low voltage), circuit loading (high loading), and location (high temperature, high humidity, vibration, etc.) in both indoor and outdoor environments. The technical basis for the sample selections of cable connections to be tested will be provided. This Program does not include high-voltage (>35KV) switchyard connections or metal enclosed bus connections.

A.1.1.37 Carborundum (B_4C) Monitoring Program

An existing Carborundum (B_4C) Monitoring Program manages the effects of aging on the Carborundum (B_4C) panels that are located in the high density spent fuel storage racks in Spent Fuel Pool A.

Administrative controls for the Program will be enhanced, prior to the period of extended operation to: (1) include provisions to monitor and trend data for incorporation in test procedures to ensure the projection meets the acceptance criteria and (2) incorporate acceptance criteria tables for accumulated weight losses of monitored Carborundum samples.

A.1.1.38 High-Voltage Insulators in the 230KV Switchyard Program

The High-Voltage Insulators in the 230KV Switchyard Program is a new program credited for aging management of the high-voltage insulators used in the power path for the overhead transmission conductors that connect CR-3 230KV Switchyard to the Backup Engineered Safeguards Transformer (BEST). The Program inspects the insulators for salt deposits or surface contamination and mechanical wear of the steel hardware connecting the insulators to one another. The high-voltage insulators within the scope of this Program are to be inspected at least once every four years.

A.1.1.39 Reactor Coolant Pressure Boundary Fatigue Monitoring Program

The Reactor Coolant Pressure Boundary (RCPB) Fatigue Monitoring Program is an existing program that includes preventive measures to mitigate fatigue cracking caused by anticipated cyclic strains in metal components of the RCPB. This is accomplished by monitoring and tracking the significant thermal and pressure transients for limiting RCPB components in order to prevent the fatigue design limit from being exceeded. The Program addresses the effects of the reactor coolant environment on component fatigue life by including, within the Program scope, environmental fatigue evaluations of the sample locations specified in NUREG/CR-6260, "Application of NUREG/CR-5999, Interim Fatigue Curves to Selected Nuclear Power Plant Components."

A.1.1.40 Environmental Qualification (EQ) Program

The existing CR-3 EQ Program, which implements the requirements of 10 CFR 50.49, will adequately manage aging of EQ equipment for the period of extended operation. 10 CFR 50.49 requires EQ components that are not qualified for the current license term to be refurbished, replaced, or have their qualifications extended prior to reaching the aging limits established in the aging evaluation. Reanalysis of aging evaluations to extend the qualifications of components is performed on a routine basis as part of the EQ Program. Important attributes for the reanalysis of aging evaluations include analytical methods, data collection and reduction methods, underlying assumptions, acceptance criteria and corrective actions (if acceptance criteria are not met). Time-Limited Aging Analysis (TLAA) demonstration option 10 CFR §54.21(c)(1)(iii), which states that the effects of aging will be adequately managed for the period of extended operation, has been chosen. The EQ Program will manage the aging effects of the components associated with the environmental qualification TLAA.

A.1.2 EVALUATION OF TIME LIMITED AGING ANALYSES

A.1.2.1 Reactor Vessel Neutron Embrittlement

Neutron embrittlement is the term used to describe changes in mechanical properties of reactor vessel (RV) materials that result from exposure to fast neutron flux (E > 1.0 MeV) within the vicinity of the reactor core, called the beltline region. The most pronounced material change is a reduction in fracture toughness. As fracture toughness decreases with cumulative fast neutron exposure, the material's resistance to crack propagation decreases. The rate of neutron exposure is defined as neutron flux, and the cumulative degree of exposure over time is defined as neutron fluence. Since extending the operating period from 40 years to 60 years will further increase the fluence levels, the 60-year fluence value must be determined and used to determine its impact upon the analyses used to support operation. The approach taken was that, if the existing analyses could not be demonstrated to remain valid for 60 years, new analyses were prepared for 60 years. If a revised analysis was not feasible, the aging effect identified within the time-limited aging analysis (TLAA) will be managed during the period of extended operation.

A.1.2.1.1 Neutron Fluence

End-of-life fluence is based on a projected value of effective full power years (EFPY) over the licensed life of the plant. For the current term of operation, end-of-life for CR-3 is 40 years and reactor vessel embrittlement calculations for pressurized thermal shock and upper shelf energy are based on fluence projections at 32 EFPY. The plant began operation in December 1976, and the plant lifetime capacity factor through 2005 is 68.2%. Assuming a plant capacity factor of 98.5% beyond 2005, CR-3 will accrue approximately 50.3 EFPY by December 2036. Therefore, a 54 EFPY fluence estimate used for calculating reactor vessel embrittlement for 60 years of operation is bounding for the period of extended operation.

AREVA NP (previously Framatome) developed a fluence analysis methodology that can be used to accurately predict the fast neutron fluence in the reactor vessel using surveillance capsule dosimetry and/or cavity dosimetry to verify the fluence predictions. This methodology was developed through a full-scale benchmark experiment that was performed at the Davis-Besse Unit 1 reactor. The benchmark experiment demonstrated that the AREVA NP methodology was unbiased and was accurate well within the NRC suggested standard deviation of 20%. The AREVA NP fluence analysis methodology is compliant with NRC Regulatory Guide (RG) 1.190, as described in topical report BAW-2241NP-A, Revision 1, "Fluence and Uncertainty Methodologies," December 1999. The AREVA NP methodology was used to calculate the neutron fluence exposure to the CR-3 reactor vessel. The fast neutron fluence (neutron energy (E) > 1.0 MeV) at the reactor vessel upper and lower plates, as well as specific welds, was calculated in accordance with the requirements of RG 1.190.

The 54 EFPY fluence values include ex-vessel cavity dosimetry data from Cycles 11 and 12 and plant operation through Cycle 14. To account for a measurement uncertainty recapture, the Cycle 14 fluxes were used for Cycle 15 and increased by a factor of 1.02 for Cycles 16 and 17; the Cycle 16 and 17 flux was increased by a factor of 1.25 for Cycles 18 through 60 years.

Reactor pressure vessel boundary components outside the beltline region have been evaluated to determine whether additional materials should be considered "beltline" material for the period of extended operation. The beltline, as defined by 10 CFR 50.61(a)(3), is the region of the reactor pressure vessel that directly surrounds the effective height of the active core and adjacent regions of the reactor pressure vessel that are predicted to experience sufficient neutron radiation damage to be considered in the selection for the most limiting material with regard to radiation damage. The threshold fluence for potential beltline material is 1.0E+17 n/cm^2, E > 1.0 MeV. The beltline materials for CR-3 for 60 years (54 EFPY) include the following:

Component	Material
Nozzle Belt Forging - Lower	AZJ 94
Upper Shell Plate	C4344-1
Upper Shell Plate	C4344-2
Lower Shell Plate	C4347-1
Lower Shell Plate	C4347-2
Upper Shell Circumferential (Circ.) Weld (Inside 40%)	SA-1769
Upper Shell Circ. Weld (Outside 60%)	WF-169-1
Upper Shell Axial Weld	WF-8
Upper Shell Axial Weld	WF-18
Upper Shell to Lower Shell Circ. Weld	WF-70
Lower Shell Axial Welds	SA-1580

The limiting beltline circumferential weld based on fluence for CR-3 at 54 EFPY is WF-70, heat number 72105. The fluence at 54 EFPY for weld WF-70, is 1.56E+19 n/cm^2. In the Master Integrated Reactor Vessel Material Surveillance Program (MIRVP), two capsules with weld wire heat number 72105 have been irradiated to fluence values equal to or greater than 1.56E+19 n/cm^2 and tested. Therefore, the MIRVP program covers the fluence at 54 EFPY for CR-3 weld WF-70, and no additional surveillance material or testing is required for 60 years of operation.

The limiting beltline axial weld based on fluence for CR-3 at 54 EFPY is WF-8, heat number 8T1762. This heat of material is not in the MIRVP, and there is no need to add this material since the CR-3 Linde 80 beltline weld materials, including WF-8, are adequately represented by the eight heats of material in the MIRVP program.

The limiting shell plate material for CR-3 is C4344-1, which was included in CR-3-specific capsules, and all specimens have been removed and tested. The 54 EFPY fluence at plate C4344-1 is predicted to be 1.60E+19 n/cm^2. Capsule CR3-F, which contained C4344-1 material, received a fluence of 1.08E+19 n/cm^2 and was removed and tested. The MIRVP has determined that no further testing is required for material C4344-1 since the plate material is not the limiting material for the CR-3 vessel and the MIRVP meets the requirements of 10 CFR 50, Appendix H.

Therefore, the neutron fluence has been projected to the end of the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii) using a methodology previously approved by the NRC. These fluence projections will be used for evaluating fluence-based TLAAs for CR-3 License Renewal.

A.1.2.1.2 Upper Shelf Energy Evaluation

Upper-shelf energy (USE) is a measure of the average energy absorbed by Charpy impact specimens tested at a temperature above the upper end of the transition region. 10 CFR 50, Appendix G, states that reactor vessel beltline materials must have Charpy upper-shelf energy (C_VUSE) in the transverse direction for base metal and along the weld for weld metal of no less than 75 ft-lb in the unirradiated condition, and must maintain C_VUSE of no less than 50 ft-lb throughout the licensed life of the vessel, unless it can be demonstrated that lower values of energy will provide margins of safety against fracture equivalent to those required by ASME Code, Section XI, Appendix G.

Upper shelf energies for beltline plates and forgings at 54 EFPY were determined using Regulatory Guide 1.99, Revision 2, Position 1.2, and are all above 50 ft-lb, which is acceptable.

As is the case for the current term of operation, the C_VUSE values for all beltline welds are below 50 ft-lb, requiring an equivalent margins analysis (EMA) for the period of extended operation. The methodology used to evaluate CR-3 beltline welds at 60 years is consistent with the EMA methods reported in BAW-2192PA, "Low Upper-Shelf Toughness Fracture Mechanics Analysis of Reactor Vessels of B&W Owners Reactor Vessel Working Group for Level A & B Service Loads," April 1994; BAW-2178PA, "Low Upper-Shelf Toughness Fracture Mechanics Analysis of Reactor Vessels of B&W Owners Reactor Vessel Working Group for Level C & D Service Loads," April 1994; and BAW-2275A, "Low Upper Shelf Toughness Fracture Mechanics Analysis of B&W

Designed Reactor Vessels for 48 EFPY," August 1999. BAW-2275A comprises Appendix B of BAW-2251A, "Demonstration of Management of Aging Effects for the Reactor Vessel," January 2002.

An updated EMA was performed on CR-3 limiting beltline welds WF-70, WF-8, and WF-18 to consider the effect of increased fluence on the J-integral, which is a function of fluence. The applied J-integral, which is due to loading, is not a function of fluence and remains unchanged from earlier analyses. The results of the updated analysis show that the first acceptance criterion of $J_{0.1}$ / J_1 > 1.0 from ASME Section XI, Article K-2200(a)(1) for Level A and B service loading is met. The results show that the second acceptance criterion of $J_{0.1}$ / J_1 > 1.0 for Level C and D service loading is also met. Therefore, the limiting CR-3 welds provide margins of safety equivalent to those of Appendix G of the Section XI of the ASME Code and have adequate upper-shelf toughness, and satisfy the requirements of Appendix G to 10 CFR 50 for operation through 54 EFPY.

Based on the above discussion, the USE analysis has been projected to the end of the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

A.1.2.1.3 Pressurized Thermal Shock Analysis

10 CFR 50.61 defines screening criteria for embrittlement of reactor pressure vessel materials in pressurized-water reactors, as well as actions that are required if these screening criteria are exceeded. The screening criteria limit the degree that a vessel material may increase in its reference temperature for pressurized thermal shock - RT_{PTS}, following neutron irradiation of the reactor pressure vessel. For circumferential welds, the pressurized thermal shock (PTS) screening criterion is 300°F maximum. For plates, forgings, and axial weld materials, the screening criterion is 270°F maximum. The projected EOL RT_{PTS} values must be shown to remain below the applicable screening temperature.

A PTS evaluation for the CR-3 RV beltline materials was performed in accordance with 10 CFR 50.61. The PTS reference temperature, RT_{PTS}, values are calculated by adding the initial RT_{NDT} to the predicted radiation-induced ΔRT_{NDT} and the margin term to cover the uncertainties in the values of initial RT_{NDT} copper and nickel contents, fluence, and the calculational procedures. The predicted radiation induced ΔRT_{NDT} is calculated using the respective RV beltline materials copper and nickel contents and the neutron fluence applicable to the CR-3 RV for License Renewal at 54 EFPY.

Evaluations for the CR-3 RT_{PTS} values were performed for each CR-3 reactor vessel beltline material with chemistry factors determined from Tables 1 and 2 in 10 CFR 50.61. In addition, the chemistry factors for the upper shell plate, heat number C4344-1 was recalculated using the available CR-3 surveillance data in accordance with RG 1.99, Revision 2.

The CR-3 RT_{PTS} values for the reactor vessel beltline materials for the period of extended operation were calculated using 54 EFPY inside wetted surface fluence projections. The limiting longitudinal welds are WF-8 and WF-18 with an RT_{PTS} of 231.3°F, which is below the screening criterion of 270ºF. The limiting circumferential weld is WF-70 with an RT_{PTS} of 253.8°F, which is below the screening criterion of 300°F. Therefore, the analyses for the shift in PTS reference temperature have been projected to the end of the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

A.1.2.1.4 Operating Pressure-Temperature (P-T) Limits Analysis

The adjusted reference temperature (ART) is the value of Initial RT_{NDT} + ΔRT_{NDT} + margins for uncertainties at a specific reactor vessel location. Neutron embrittlement increases the ART. Thus, the minimum temperature at which a reactor vessel is allowed to be pressurized increases over the licensed period. The ART of the limiting beltline material is used to adjust the beltline pressure-temperature (P-T) limits to account for radiation effects. 10 CFR Part 50, Appendix G requires reactor vessel thermal limit analyses to determine operating P-T limits for boltup, hydrotest, pressure tests, normal operation, and anticipated operational occurrences. Operating limits for pressure and temperature are required for three categories of operation: 1) hydrostatic pressure tests and leak tests, 2) non-nuclear heat-up/cooldown and low level physics tests, and 3) core critical operation.

The ART values for the CR-3 reactor vessel beltline region materials are calculated in accordance with RG 1.99, Revision 2, by adding the initial RT_{NDT} to the predicted radiation-induced ΔRT_{NDT}, and a margin term to cover the uncertainties in the values of initial RT_{NDT}, copper and nickel contents, fluence, and the calculational procedures. The predicted radiation induced ΔRT_{NDT} is calculated using the respective reactor vessel beltline materials copper and nickel contents and the neutron fluence applicable to 54 EFPY. The evaluations for the CR-3 ART were performed at the 1/4T and 3/4T wall location of each beltline material with chemistry factors determined from Tables 1 and 2 in RG 1.99, Revision 2. In addition, the chemistry factors for the Upper Shell Plate, heat number C4344-1, were recalculated using the available CR-3 surveillance data.

In this manner, ART results for the CR-3 reactor vessel beltline region materials applicable to 54 EFPY were determined. Based on these, the controlling beltline material for the CR-3 reactor vessel with respect to P-T limits are the Upper Shell Circumferential Weld (Inside 40%) SA-1769 (at 1/4T) and the Upper/Lower Shell Circumferential Weld WF-70 (at 3/4T).

The pressure-temperature operating limits were developed in accordance with the requirements of 10 CFR Part 50, Appendix G, utilizing the analytical methods and flaw acceptance criteria of topical report BAW-10046A, "Methods of Compliance with Fracture Toughness and Operational Requirements of 10 CFR 50, Appendix G," Revision 2, June 1996, and ASME Code Section XI, Appendix G, 2001 edition through 2003 Addenda. CR-3 has implemented changes in the P-T limit curves throughout the current period of operation. ASME Code Cases N-588 and N-640 are incorporated in ASME Section XI, Appendix G, 2001 edition through 2003 Addenda. With the incorporation of the new methodology from ASME Code Section XI, Appendix G, 2001 edition through 2003 Addenda, and the improved replacement RV head, the 54 EFPY uncorrected P-T limits provide more operating room than the 32 EFPY uncorrected P-T curves.

CR-3 will continue to implement changes in the P-T limit curves in the PTLR, as required by Appendix G of 10 CFR part 50, for the remainder of the current period of operation and for the extended period of operation. The P-T limits for the remainder of the current period of operation and for the extended period of operation will be managed by using approved fluence calculations when there are changes in power or core design, and with surveillance capsule results. Updating the P-T limit curves using the described approach will assure that the operational limits remain valid for the remainder of the current period of operation and for the extended period of operation. Maintaining the P-T limit curves in accordance with Appendix G of 10 CFR 50 assures 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)(iii).

A.1.2.1.5 Low-Temperature Overpressure Limits Analysis

ASME Section XI, Appendix G, establishes procedures and limits for RCS pressure and temperature primarily for low temperature conditions to provide protection against non-ductile failure of the RV. The Low Temperature Overpressure Protection System (LTOPS) assures that these limits are not exceeded when it is enabled at low temperatures.

The LTOP setpoints for CR-3 have been reanalyzed to support operation to the end of the period of extended operation. The revised LTOP setpoints will be implemented when the revised P-T limit curves are implemented, prior to exceeding 32 EFPY. Maintaining the LTOP setpoints in accordance with Appendix G of 10 CFR 50 and 10 CFR 50.60 assures 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)(iii).

A.1.2.1.6 Reactor Vessel Underclad Cracking

Underclad cracking (UCC) refers to intergranular separations in the heat affected zones of low alloy base metal under austenitic stainless steel cladding. B&W conducted an intensive investigation of UCC in the 1970 and showed the subject flaws are present only in A-508, Class 2, forgings manufactured to a coarse grain practice and clad by high-heat-input submerged arc process such as the six-wire, strip, and the two-wire series arc. The investigations also noted that no anomalies were observed in SA-533

Grade B, Class 1 plate materials clad by any of the high-heat-input processes. The results of the fracture mechanics analysis demonstrated that the critical crack size required to initiate fast fracture is several orders of magnitude greater than the assumed maximum flaw size plus predicted growth due to design fatigue cycles.

The fracture mechanics analysis for underclad cracking was updated in BAW-2274A, "Fracture Mechanics Analysis of Postulated Underclad Cracks in B&W Designed Reactor Vessels for the Period of Extended Operation," August 1999, to include the period of extended operation. The revised analysis concluded that postulated underclad cracking in the RVI meets the acceptance criteria of the ASME Code, Section XI, IWB-3612. The maximum crack growth and applied stress intensity factor for normal and upset conditions occur in the nozzle belt region. The fracture toughness margin for normal and upset conditions was determined to be 3.63, which is greater than the required toughness margin of 3.16. The maximum applied stress intensity for the emergency and faulted condition occurs in the closure head to head flange regions. The fracture toughness margin for emergency and faulted condition was 2.42, which is greater than the required toughness margin of 1.41.

The revised analysis was based on fracture toughness properties associated with 60-year fluences and was intended to bound the B&W fleet. While CR-3 is not specifically listed as a participant in BAW-2274A, the generic evaluation used bounding loads from the entire fleet of B&W 177 FA lowered loop operating plants. The loads used in the analysis are bounding for CR-3, provided that the material properties of applicable CR-3 vessel are bounded by those presented in BAW-2274A. Three vessel regions were evaluated: (1) nozzle belt, (2) closure flange, and (3) beltline.

The ART at the inside surface of CR-3 Lower Nozzle Belt Forging AZJ 94 is 3.0°F higher than the ART evaluated for the previously limiting forging. Therefore, the CR-3 nozzle belt forging is not bounded and was re-analyzed for 54 EFPY. The results show that the postulated 0.353 in.-deep flaw on the inside surface of the CR-3 Lower Nozzle Belt Forging satisfies the IWB-3612 acceptance criteria for fracture toughness margin. Considering 54 EFPY of fatigue crack growth, the final flaw size is 0.487 in., and the fracture toughness margin of 3.49 for Level A and B Service Loadings is greater than the required value of 3.16. The available fracture toughness margin for Level C and D Service Loadings is 2.50 which exceeds the required value of 1.41. The results demonstrate that a postulated underclad crack in the CR-3 Lower Nozzle Belt Forging would satisfy the flaw acceptance criteria of the ASME Code for 54 EFPY of operation over a period of 60 years.

Evaluation of the closure flange in BAW-2274A identified limiting closure flange material based on an inside surface fluence of 7.78E+16 n/cm^2. For CR-3, the fluence at 54 EFPY at the closure flange is 4.38E+13 n/cm^2 and remains bounded.

CR-3 beltline upper and lower shell plates are fabricated from SA-533 Grade B, Class 1 and are not susceptible to underclad cracking. Since CR-3 does not have A-508, Class 2 forgings in the upper and lower shell region, the increase in ART due to increased fluence at 54 EFPY is not relevant for the evaluation of underclad cracking.

Based on the above, the underclad cracking analysis for CR-3 has been projected through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

A.1.2.1.7 Reduction in Fracture Toughness of Reactor Vessel Internals

Reduction of fracture toughness of reactor vessel internals is an aging effect caused by exposure to neutron irradiation. Prolonged exposure to high-energy neutrons results in changes to the mechanical properties, such as an increase in tensile and yield strength, and decreases in ductility and fracture toughness. The extent of loss of fracture toughness is a function of both the irradiation temperature and neutron fluence. The reactor vessel internals components most susceptible to reduction in fracture toughness are those nearest to the reactor core.

The effect of irradiation on the mechanical properties and deformation limits for the reactor vessel internals was evaluated for the current term of operation in Appendix E of topical report BAW-10008, Part 1, Revision 1, "Reactor Internals Stress and Deflection Due to Loss-of-Coolant Accident and Maximum Hypothetical Earthquake," June, 1970. The analysis concluded that the reactor internals will have adequate ductility to absorb local strain at the regions of maximum stress intensity, and that irradiation will not adversely affect deformation limits. This analysis is a TLAA for the current term of operation.

In accordance with the guidance of NUREG-1801, Revision 1, regarding the aging management of reactor vessel internals components, CR-3 will:

1. Participate in the industry programs for investigating and managing aging effects on reactor internals,

2. Evaluate and implement the results of the industry programs as applicable to the reactor internals, and

3. Upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor vessel internals to the NRC for review and approval.

Based on this evaluation, the reduction in fracture toughness of reactor vessel internals will be managed, consistent with the commitment to participate in industry programs related to the reactor vessel internals, through the end of the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii). This commitment is reiterated in Subsection A.1.1.

A.1.2.2 Metal Fatigue

The CR-3 approach is to identify the latest design fatigue analyses associated with each NSSS component within the reactor coolant pressure boundary (RCPB) in order to demonstrate that the design analyses will remain bounding through the period of extended operation. Components within the scope of this review include non-pressure boundary reactor internals components.

The first step in the evaluation was to establish the current fatigue design bases for the major NSSS components. This was done by reviewing component design reports, amendments to those reports, and the assessment of the impact of the NRC approved measurement uncertainty recapture 1.6% power uprate to identify the full set of NSSS design transients used in the fatigue evaluations.

The second step in the evaluation was to gather and review plant design information, actual plant transient data from the RCS and other sources, and archived RCS operational parametric data. This information was used to develop actual operational transients experienced from plant startup through December 2007. The transient data was obtained from the CR-3 Cycle and Transient Monitoring Program, input from plant personnel, and historical data obtained from CR-3 records.

There is considerable margin after 30 years of operation to the NSSS design transient cycles originally defined for 40 years, and CR-3 has determined there is no need to increase the number of NSSS design transients for the period of extended operation. The RCS CUFs may be conservatively projected to 60 years of operation by multiplying the 40-year CUFs by a factor of 1.5; this is equivalent to multiplying the NSSS design transient cycles by a factor of 1.5. Therefore, 40-year usage factors in excess of 0.67 (1.0/1.5) may be assumed to exceed the ASME Code, Section III limit of 1.0 at 60-years. This method of usage factor projection is conservative since CR-3 has determined that it is unlikely that the NSSS design transients for 40 years will be exceeded at 60 years of operation.

The final step in the evaluation was to consider the effects of the reactor water environment on 40-year fatigue usage factors at selected NSSS locations as identified in NUREG/CR-6260, "Application of NUREG/CR-5999 Interim Design Curves to Selected Nuclear Power Plant Components," as required by NUREG-1801, Revision 1.

A.1.2.2.1 Reactor Vessel Fatigue Analyses

The reactor vessel (RV) was designed in accordance with Section III of the ASME Code – Class 1, for the replacement closure head, and Class A, for the remaining vessel items; therefore, metal fatigue was considered in the design of the RV components. CUF analyses for the RV are applicable TLAAs, since they are based on NSSS design transient cycles originally defined for 40 years. For the components that are part of the

RV, one pressure-retaining item has a 40-year CUF that exceeds 0.67: the Lower Service Support Structure attachment weld with a CUF of 0.72. Therefore, the effects of aging on the intended function(s) will be adequately managed for the period of extended operation using the RCPB Fatigue Monitoring Program, and the effects of aging will be adequately managed according to 10 CFR 54.21(c)(1)(iii).

A.1.2.2.2 Reactor Vessel Internals Fatigue Analyses

The CR-3 reactor vessel internals (RVI) were designed and constructed prior to the development of ASME Code requirements for core support structures. Therefore, existing industry structural practice was used in the design of the internals structural members; and the only specific fatigue analyses performed in the original design were those that addressed high cycle fatigue reported in BAW-10051, "Design of Reactor Internals and Incore Instrument Nozzles for Flow Induced Vibration," September 1, 1972. In modifications following original design, plant-specific fatigue analyses were performed for the reactor vessel internals replacement bolts as presented in BAW-1843PA, "The B&WOG Evaluation of Internals Bolting Concerns in 177 FA Plants," January 1986, and BAW-1789P, "The B&WOG Evaluation of Internals Bolting Concerns in 177 FA Plants," August 1984. These topical reports summarize fatigue analyses performed to the ASME Code, Section III, Subsection NG, including both high-cycle fatigue from flow induced vibrations (FIV) and low-cycle fatigue from NSSS design transients.

BAW-10051 calculated stress values for the redesigned RVI and compared them to endurance limit stress values. The methodology used in BAW-10051 was extended from 40 years to 60 years by multiplying the assumed endurance limit cycles by 1.5 and then using 1013 cycles to determine the endurance limit based on more recent ASME fatigue curves which extend now to 1011 cycles. The component item stress values in BAW-10051 were compared to the recalculated endurance limit values and were shown to be acceptable. In this manner, the FIV analysis has been projected to the end of the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii),

The RV internals bolts that were replaced at CR-3 include 120 Upper Core Barrel bolts made from A-286, 60 Lower Core Barrel bolts made from X-750, 96 Lower Thermal Shield bolts made from X-750, and 72 Surveillance Specimen Holder Tube (SSHT) bolts made from X-750. The Lower Core Barrel bolts and Lower Thermal Shield replacement bolts have 40-year CUFs that exceed 0.67. Therefore, the effects of aging on the intended functions will be adequately managed for the period of extended operation using the RCPB Fatigue Monitoring Program in accordance with 10 CFR 54.21(c)(1)(iii).

A.1.2.2.3 Control Rod Drive Mechanism Fatigue Analysis

The "Type C" control rod drive mechanism (CRDM) motor tube was designed in accordance with ASME Code, Section III, Class A, 1968 Edition with Addenda through

Summer 1970, and metal fatigue was considered in the design of the component. CUFs of the CRDM motor tube were not calculated as it was shown that the motor tube did not require analysis for cyclic operation in accordance with ASME Section III, paragraph N-415.1. Calculations performed for the CRDM motor tube are based on NSSS design transients which have not been increased for the period of extended operation. Therefore, the analyses are acceptable for the period of extended operation, in accordance with 10 CFR 54.21(c)(1)(i), since the NSSS design transients have not been revised.

A.1.2.2.4 Reactor Coolant Pump Fatigue Analysis

The reactor coolant pumps (RCPs) were designed in accordance with the ASME Code, Section III, Class A, but were not code stamped, and metal fatigue was considered in the design of the component. CUFs of the RCPs are applicable TLAAs since the CUFs are based on NSSS design transient cycles originally defined for 40-years of operation. Considering the RCP casing, cover, and shaft, the cover has the largest 40-year design usage factor at 0.65. In addition, calculations performed in accordance with N-415.1(a) through N-415.1(f) of the ASME Code, Section III, for the RCP seal and heat exchanger are based on NSSS design transients that have not been increased for the period of extended operation. Therefore, the analyses for the RCP casing, cover, and shaft have been projected to the end of the period of extended operation, in accordance with 10 CFR 54.21(c)(1)(ii), and the analyses of the RCP seal and heat exchanger performed in accordance with N-415.1(a) through N-415.1(f) of the ASME Code, Section III, are acceptable for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

A.1.2.2.5 Steam Generator Fatigue Analysis

The Once-Through Steam Generators (OTSGs) were designed in accordance with the ASME Code, Section III, Class A, and metal fatigue was considered in the design of the components. CUFs of the OTSG components are applicable TLAAs since the CUFs are based on NSSS design transient cycles originally defined for 40 years of operation. For the components that are part of the OTSG, five items have 40-year CUFs that exceed 0.67: the Emergency Feedwater (EFW) Nozzle Studs, Main Feedwater (MFW) Nozzle, Mechanical Sleeves, Remote Welded Plug, and the Support Skirt. Therefore, the effects of aging on the intended function(s) will be adequately managed for the period of extended operation by means of the CR-3 RCPB Fatigue Monitoring Program in accordance with 10 CFR 54.21(c)(1)(iii).

A.1.2.2.6 Pressurizer Fatigue Analysis

The Pressurizer was designed in accordance with the ASME Code, Section III, Class A, and metal fatigue was considered in the design of the component. The Pressurizer surge nozzle was modified in 2007 to include a weld overlay over the Alloy 600 weld that connects the surge nozzle to a stainless steel safe end. The weld overlay was designed in accordance with the 1989 Edition of ASME Code, Section III, Subsection NB. For the components that are part of the Pressurizer, three items have 40-year CUFs that exceed 0.67: the Surge Nozzle with weld overlay, the Heater Bundle closure seal weld, and the Thermowell Nozzle. Therefore, the effects of aging on the intended functions will be adequately managed for the period of extended operation by means of the CR-3 RCPB Fatigue Monitoring Program in accordance with 10 CFR 54.21(c)(1)(iii).

A.1.2.2.7 Reactor Coolant Pressure Boundary Piping (USAS B31.7) Fatigue Analysis

RCPB piping includes all piping within the ASME, Section XI, Subsection IWB inspection boundary at CR-3. The IWB inspection boundary includes B&W-supplied main coolant piping and portions of Architect/Engineer-supplied ancillary systems, e.g., Decay Heat Removal, Core Flood, and Make Up & Purification Systems, including Low Pressure Injection, High Pressure Injection, and Makeup/Letdown piping, attached to the Reactor Coolant System piping. The IWB inspection boundary within the ancillary systems typically extends to the first or second isolation valve or to a flow restricting orifice. The B&W-supplied main coolant piping was designed in accordance with USAS B31.7, and the ancillary systems connected to the main coolant piping were designed in accordance with USAS B31.1.

The scope of USAS B31.7 piping at CR-3 includes the 36 in. hot leg piping, including attached branch connections and safe ends; 28 in. cold leg piping, including attached branch connections and safe ends; Pressurizer surge line piping; and Pressurizer spray line piping. CUFs of USAS B31.7 RCPB piping are applicable TLAAs since they are based on NSSS design transient cycles originally defined for 40 years of operation.

For the components that are part of the RCPB piping, the Pressurizer spray line piping and High Pressure Injection/Makeup (HPI/MU) Nozzle safe end CUFs exceed 0.67 at 40 years.

In accordance with NRC letter (H. Silver) to FPC (P. Beard), "Crystal River Unit 3 - NRC Bulletin 88-08 'Thermal Stress in Piping Connected to Reactor Coolant Systems,' (TAC No. M69621)," dated June 18, 1992, the piping items within the scope of NRC Bulletin 88-08 at CR-3 include the HPI/MU nozzle, safe end, and thermal sleeve. Fatigue of the HPI/MU nozzle, safe end, and thermal sleeve is evaluated above for the period of extended operation.

Therefore, the effects of aging on the intended function(s) will be adequately managed for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii) by means of the RCPB Fatigue Monitoring Program.

A.1.2.2.8 USAS B31.1.0 Piping - RCPB Class 1 Fatigue Analysis

RCPB Class 1 piping designed in accordance with USAS B31.1.0 Piping Code includes piping in ancillary systems connected to the B&W-supplied main coolant piping. These systems include Decay Heat Removal, Core Flood, and Makeup & Purification Systems, including Low Pressure Injection, High Pressure Injection, and Makeup/Letdown piping. For piping designed in accordance with the USAS B31.1.0-1967 Code rules, the designer was required to determine the overall number of thermal cycles anticipated for the component in 40 years, and was required to apply stress range reduction factors if this number exceeded 7,000. Power piping at CR-3 complies with USAS B31.1.0-1967. Since these analyses were based upon the number of cycles expected to occur during the original license period, these analyses are also considered to be TLAAs.

The applicable transient cycles for piping systems designed in accordance with USAS B31.1.0-1967 rules were originally determined by summing the individual transients to which the component would be exposed in 40 years. In order to evaluate these TLAAs for 60 years, the numbers of cycles now expected to occur in 60 years should be compared to the numbers of design cycles that were considered in these analyses. For the RCPB systems, the number of thermal cycles correlates with plant heatups and cooldowns. Since the transient set (and associated cycles) in the RCS Functional Specification is being maintained, the analytical basis for these components remains unchanged. Therefore, the analyses for these components remain valid for the period of extended operation in accordance with10 CFR 54.21(c)(1)(i).

The HPI/MU safe end is welded to a stainless steel spool piece that was analyzed for fatigue analysis in accordance with USAS B31.7 to support NRC Bulletin 88-08. The 40-year CUF for the spool piece is 0.94. Therefore, the effects of aging on the intended function(s) for the period of extended operation will be adequately managed by means of the RCPB Fatigue Monitoring Program in accordance with 10 CFR 54.21(c)(1)(iii).

A.1.2.2.9 USAS B31.1.0 Piping - Non-Class 1 Fatigue Analysis

Piping designed in accordance with USAS B31.1.0 Piping Code was not required to have analyses of cumulative fatigue usage, but cyclic loading was considered in a simplified manner in the design process. For piping designed in accordance with the USAS B31.1.0-1967 code rules, the designer was required to determine the overall number of thermal cycles anticipated for the component in 40 years, and was required to apply stress range reduction factors if this number exceeded 7,000. Power piping at CR-3 complies with USAS B31.1.0-1967. Since these analyses were based upon the number of cycles expected to occur during the original license period, these analyses are also considered to be TLAAs.

The applicable transient cycles for piping systems designed in accordance with USAS B31.1.0-1967 rules were originally determined by summing the individual transients to which the component would be exposed in 40 years. In order to evaluate these TLAAs for 60 years, the numbers of cycles now expected to occur in 60 years should be compared to the numbers of design cycles that were considered in these analyses. For most systems, the number of thermal cycles correlates with plant heatups and cooldowns, which are limited to 240 cycles. Since the transient set (and associated cycles) in the RCS Functional Specification is being maintained, the analytical basis for these components remains unchanged. Therefore, the analyses for these components remain valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

For components in systems whose cycles do not track plant heatups and cooldowns, a specific evaluation of the components operating history was performed. Examples of components in this group include engine exhaust components for diesel engines in the Emergency Diesel Generator, Emergency Feedwater, and Fire Protection Systems; Sampling piping and components in the Liquid and Post-Accident Liquid Sampling Systems; and the Turbine-Driven Emergency Feedwater Pump Turbine. Evaluations were performed that projected the number of expected cycles in 60 years. The evaluations concluded that the components remain qualified through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

A.1.2.2.10 Environmentally-Assisted Fatigue Analysis

The effects of reactor water environment on fatigue were evaluated for a subset of representative components. The representative components selected were based upon the evaluations in NUREG/CR-6260, "Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components." The representative components evaluated are as follows:

- Reactor Vessel Shell and Lower Head (including incore instrumentation nozzles)
- Reactor Vessel Inlet and Outlet Nozzles
- Pressurizer Surge Line (including hot leg and Pressurizer surge nozzles)
- HPI/MU Nozzle
- Core Flood Nozzle
- Decay Heat Removal System Class 1 Piping

The methods used to evaluate environmental effects on fatigue were based on NUREG/CR-6583, "Effects of LWR Coolant Environments on Fatigue Design Curves of Carbon and Low Alloy Steels," NUREG/CR-5704, "Effects of LWR Coolant Environments on Fatigue Design Curves of Austenitic Stainless Steels," and NUREG/CR-6717, "Environmental Effects of Fatigue Crack Initiation in Piping and Pressure Vessel Steels." In addition, the method used to obtain environmental effects for nickel-based alloy was obtained from H. S. Metha and S. R. Goeeslin, "Environmental Factor Approach to Account for Water Effects in Pressure Vessel and Piping Fatigue Evaluations," Nuclear Engineering and Design, 1998. Environmental fatigue life correction factors (F_{en}) were used to obtain adjusted cumulative fatigue usage (U_{en}) which includes the effects of reactor water environments.

Environmentally-adjusted U_{en} factors at all locations are based on application of environmental penalty factors to the ASME 40-year CUF values. Bounding F_{en} values of 2.45 for low-alloy steel, 15.35 for stainless steel, and 1.49 for Alloy 600 were applied to the 40-year design CUFs with the exception of surge line piping and decay heat injection piping.

For surge line piping, the ASME Section III analysis of record for CR-3 was revised to include the effects of environmentally assisted fatigue. The environmental correction factor F_{en} from NUREG/CR-5704 was used to determine the number of allowable cycles for each load pair. The F_{en} correction factor was obtained by integration from peak to valley considering transformed metal temperature, transformed strain rate, and transformed dissolved oxygen. The strain rate was assumed to be at 0.0004%/sec or less, and transformed strain rate was held constant at Ln (0.001). Based on historical data, dissolved oxygen is 0.05 ppm or less, and transformed oxygen was held constant at 0.026. Transformed metal service temperature was determined by integration of metal temperature for the load pair analyzed. Therefore, the F_{en} varies from 2.55 (when metal temperature is less than 392 °F) to a maximum of 15.35 (when metal temperature equals or exceeds 392 °F). Thermal striping, which was considered separately, was assigned an F_{en} of 1.0 as the maximum calculated strain amplitude is less than the threshold strain amplitude of 0.097% listed in NUREG/CR-5704.

The Decay Heat Injection piping at CR-3 was designed in accordance with USAS B31.1 and therefore did not receive an explicit CUF evaluation. A fatigue evaluation of the Decay Heat Injection piping was performed specifically for License Renewal using USAS B31.7, 1969 Edition. The CUF was multiplied by the bounding F_{en} value of 2.55.

Based on the results of this evaluation, the effects of aging on the intended function(s) will be adequately managed for the period of extended operation using the CR-3 RCPB Fatigue Monitoring Program in accordance with 10 CFR 54.21(c)(1)(iii).

A.1.2.2.11 RCS Loop Piping Leak-Before-Break Analysis

The application of leak-before-break (LBB) to the CR-3 RCS main coolant piping is described in Topical Report BAW-1847, "The B&W Owners Group Leak-Before-Break Evaluation of Margins Against Full Break for RCS Primary Piping of B&W Designed NSSS," Revision 1, September 1985, which provides the technical basis for evaluating postulated flaw growth in the main RCS piping under normal plus faulted loading conditions and was approved by the NRC. The TLAA in BAW-1847, Revision 1, addresses flaw growth. In addition, the report included a qualitative assessment of thermal aging of cast austenitic stainless steel (CASS) RCP inlet and outlet nozzles; this assessment is not considered a TLAA. However, reduction of fracture toughness by thermal aging of the RCP inlet and exit nozzles was evaluated for license renewal to ensure that the conclusions of the LBB evaluation reported in BAW-1847, Revision 1, remain valid for the period of extended operation.

The LBB analysis reported in BAW-1847, Revision 1, postulated a surface flaw at selected locations of the piping system, and a fatigue crack growth analysis was performed to demonstrate that the flaws are likely to propagate in the through-wall direction and develop leakage before they will propagate circumferentially around the pipe. Flaw growth calculations were based on the original transient cycles that were defined for 40 years of operation for the RCS components. These transient cycles have not been revised for License Renewal and are being monitored by the Reactor Coolant Pressure Boundary Fatigue Monitoring Program. If a transient cycle count approaches or exceeds the allowable design limit, corrective actions are taken. Therefore, the flaw growth evaluation reported in BAW-1847, Revision 1, remains valid for the period of extended operation in accordance with 10 CFR 54.21 (c)(1)(i) since CR-3 has not revised the transients defined in the RCS design specification for License Renewal.

The susceptibility of the RCS main coolant piping to thermal aging was qualitatively addressed in Section 3.3.4.3 of BAW-1847, Revision 1. There are no RCS main coolant piping segments fabricated from CASS. However, the heat affected zone of the welded joint that connects the wrought austenitic stainless steel pump transition piece to the CASS RCP inlet and exit nozzles may be susceptible to thermal embrittlement. At the time of the report, it was assumed that the fracture toughness values for aged CASS were bounded by the ferritic piping and ferritic weldments. Since that time, a significant amount of data has been obtained regarding thermal aging of CASS materials. Therefore, the fracture toughness curves for the ferritic base metal and ferritic weld metals used in the RCS piping LBB analysis were compared to the lower-bound fracture toughness curves of CR-3 RCP CASS materials (i.e., statically cast CF8M) from NUREG/CR-6177, "Assessment of Thermal Embrittlement of Cast Stainless Steels," by Chopra and Shack, Argonne National Laboratory Report, U.S. Nuclear Regulatory Commission, Washington DC, May 1994. The fracture toughness curve of the lower-bound CASS material is below the fracture toughness curves used in the RCS piping LBB analysis. Therefore, the assumption in BAW-1847, Revision 1, that the fracture toughness of the ferritic piping and ferritic weldments bounds the fracture toughness of CASS required further evaluation for License Renewal.

A flaw stability analysis was performed using the lower-bound CASS fracture toughness curves from the Argonne report cited above to show acceptability of LBB for the RCS main coolant piping for the period of extended operation. The most limiting material and location used in the RCS piping LBB analysis was determined to be the base metal material of the straight section of the 28 in. cold leg pipe. Both the suction and discharge nozzles of the RCP casings are attached to the 28 in. cold leg pipes and have similar geometries and applied loads as the limiting location used for the LBB analysis. The discharge and suction nozzles of the RCP casings were evaluated for LBB using lower-bound CASS fracture toughness properties.

Bounding 10 gpm leakage crack sizes for the RCP suction and discharge nozzle were determined using a method consistent with that reported in BAW-1847, Revision 1. In the revised analysis, the applied loadings were considered using the absolute sum load combination method. Therefore, in accordance with NUREG-0800, SRP 3.6.3, a margin of 1.0 on load was used. The leakage flaw size for the suction nozzle was determined to be 4.31 in. and the leakage flaw size for the discharge nozzle was determined to be 4.43 in. In addition, a crack extension value of 0.6 in. was considered in the flaw stability analysis. A flaw stability analysis was performed for the RCP suction and discharge nozzles, and the discharge nozzle was found to be limiting. The maximum applied J value at the discharge nozzle, for the 10 gpm leakage flaw size, was determined to be 0.510 kips/in. The critical crack size was determined to be 10.8 in. Therefore, the margin on flaw size was determined to be 2.4 (i.e., 10.8/4.43). This is greater than the required margin of 2.0 in accordance with SRP 3.6.3. Based on the results of this analysis, it is concluded that the required margins for LBB per SRP 3.6.3 are met, even with consideration of the lower-bound CASS fracture toughness properties for the suction and discharge nozzles.

Therefore, it has been demonstrated that the fatigue flaw growth analysis reported in BAW-1847, Revision 1, remains valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i) since the number of NSSS design transients will not be revised for License Renewal. The remainder of the generic LBB analysis for the B&W operating plants reported in BAW-1847, Revision 1, remains valid for the period of extended operation with the exception of the original qualitative assessment of reduction of fracture toughness by thermal aging of CASS. The assessment of reduction of fracture toughness by thermal aging of CASS is not considered a TLAA. Reduction of fracture toughness of the RCP nozzles was determined to be acceptable for the period of extended operation through the flaw stability analysis described above. In addition, recent NRC concerns related to Alloy 82/182 and LBB analyses are addressed in the industry's submittal MRP-140, "Materials Reliability Program: Leak-Before-Break Evaluation for PWR Alloy 82/182 Welds," EPRI, Palo Alto, CA: 2005, 1011808. The Alloy 82/182 welds within the scope of BAW-1847, Revision 1, are the welds that connect the 28 in. stainless steel carbon steel cold leg piping to the stainless safe pump transition pieces. Based on the above, the flaw growth analysis remains valid for the period of extended operation.

A.1.2.3 Environmental Qualification of Electric Equipment

The existing CR-3 EQ Program is credited for aging management of electric equipment important to safety in accordance with the requirements of 10 CFR 50.49. 10 CFR 50.49 requires EQ components that are not qualified for the current license term to be refurbished, replaced, or have their qualifications extended prior to reaching the aging limits established in the aging evaluation. Reanalysis of aging evaluations to extend the qualifications of components is performed on a routine basis as part of the EQ Program. Important attributes for the reanalysis of aging evaluations include analytical methods, data collection and reduction methods, underlying assumptions, acceptance criteria and corrective actions (if acceptance criteria are not met). TLAA demonstration option 10 CFR §54.21(c)(1)(iii), which states that the effects of aging will be adequately managed for the period of extended operation, has been chosen. The EQ Program will manage the aging effects of the components associated with the environmental qualification TLAA.

A.1.2.4 Concrete Containment Tendon Prestress

The CR-3 Reactor Building consists of a prestressed reinforced concrete cylinder and hemispherical dome. The cylinder wall is prestressed utilizing a two-way post-tensioning system. The dome roof is prestressed utilizing a three-way post-tensioning system. The prestressing tendons tend to lose their prestressing forces with time due to creep and shrinkage of concrete and relaxation of the prestressing steel. Loss of tendon prestress is a TLAA; therefore, the adequacy of the prestressing forces is reviewed for the period of extended operation.

There have been eight tendon surveillance tests since CR-3 plant startup in December 1976. Since 1997, these tests have been performed under the ASME Section XI, Subsection IWL Program. The IWL program inspects a sample of tendons from each category (dome, vertical, and hoop) and confirms that the acceptance criteria have been met and, therefore, that tendon prestresses will remain above minimum required values for the succeeding inspection interval. The program recalculates the regression analysis trend lines of these three groups, based on individual tendon forces consistent with NRC Information Notice 99-10, "Degradation of Prestressing Tendon Systems in Prestressed Concrete Containments," using individual-tendon data rather than averages, to confirm whether average prestresses are expected to remain above their minimum required values for the remainder of the licensed operating period.

For the purposes of extending the CR-3 plant operating period, the regression analysis was used to extrapolate the tendon prestress forces to the end of the extended period of operation. The values computed demonstrated that prestress in all three groups of tendons should remain above the applicable minimum required values for the 60-year period of extended operation and that, therefore, the tendons should maintain their design basis function.

The TLAA evaluation addressed tendon loss of preload, using 10 CFR 54.21(c)(1)(ii), to project the tendon preload to the end of the 60-year service period for each group of tendons. The projected "average" preload values at the end of the 60-year service period are then compared with the required minimum average tendon preload. For each group of tendons, the projected preload value exceeds the required minimum average tendon preload. Therefore, prestress in all three groups of tendons will remain above the applicable minimum required values for the period of extended operation; and the tendons will perform their intended function.

A.1.2.5 Containment Liner Plate, Metal Containments, and Penetrations Fatigue Analysis

A.1.2.5.1 Fuel Transfer Tube Expansion Bellows Cycles

Fuel Transfer Tube Expansion Bellows connect the Fuel Transfer Tubes to the Refueling Canal in the Reactor Building and to the Spent Fuel Pool in the Auxiliary Building. Per plant specifications, the Expansion Bellows shall be fabricated, as a minimum, to the requirements of Section VIII of the ASME Code and inspected in accordance with the requirements of ASME Code, Section III, Class B vessels. Each Expansion Bellows is designed to withstand a total of 5,000 cycles of expansion and compression over a lifetime of 40 years. This analysis ensures that the lifetime may be extended to 60 years without exceeding the design criterion of 5,000 cycles.

Expansion bellows cycles occur each refueling outage due to thermal cycling when the Fuel Transfer Tubes are flooded with refueling water then drained for return of the plant to operation. Assuming a period of mid-loop operation that involves a partial drain and refilling of the canal, bellows cycling would occur twice every refueling outage; however, cycling has been assumed to occur three times every refueling outage for additional conservatism. The number of cycles applied to the expansion bellows in the Reactor Building is assumed also to apply to the expansion bellows in the Auxiliary Building. There are 19 refueling outages planned for the 40-year life of the plant. The number of refueling outages over 60 years of life is 60/40 x 19 = 28.5 or 29 refueling outages. The maximum number of operating cycles projected to be experienced over the 29 refueling outages during a 60-year period is:

29 refueling outages x 3 cycles/refueling outage = 87 cycles.

Since the total number of cycles for the Fuel Transfer Tube Expansion Bellows is less than 5,000 cycles, no reanalysis of the design calculations is necessary. Therefore, the Fuel Transfer Tube Expansion Bellows design analyses of record remain valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

A.1.2.6 Other Plant-Specific Time-Limited Aging Analyses

A.1.2.6.1 Bedrock Dissolution from Groundwater Analysis

FSAR Section 2.5.3.4 documented a Bedrock Solutioning Study at CR-3. The solutioning process is the result of fresh water entering the underground areas below the plant and attacking the limestone sediments leaving a labyrinth of channels throughout the rock mass. The percent of rock dissolved over the 40-year life of the plant was calculated using different methods; and a determination was made that the percent of rock dissolved represents an insignificant amount and would have an insignificant effect on the stability of the rock mass. To extend this value to 60 years, the total maximum volume of dissolved bedrock was multiplied by the ratio of 60years/40years for an additional 20 years of extended life.

The analysis for 40 years was computed in three ways; however, the conclusion of one of these methods, the extreme case, was not used in the conclusions presented in the FSAR. Therefore, the 40-year results reported in FSAR were computed in two ways. One method determined that 1.5×10^{-5} % of the bedrock was dissolved over the forty year life of the plant. This was based on assuming the law of uniformitarianism was applicable and that 15% of the rock mass has been dissolved in 40 million years and definitely in more than 40,000 years. The 15% was based on the results of the exploratory and grout hole drilling at the site which indicated that the volume of solution channels was probably not greater than 15%. Thus, the total maximum volume of dissolved bedrock was:

$$1.5 \times 10^{-5} \% \times 60/40 = 2.25 \times 10^{-5} \%.$$

Another method determined that 4×10^{-3} % of the bedrock would be dissolved over the 40-year life of the plant. This was based on information obtained from the U.S. Geologic Survey for dissolved solids over a large land area that included the CR-3 site. For an additional 20 years of extended life, the total maximum volume of dissolved bedrock was determined as follows:

$$4 \times 10^{-3} \% \times 60/40 = 6 \times 10^{-3} \%.$$

The conclusions of the 60-year projections are that the range in percent of the rock dissolved would be between 2.25×10^{-5} % and 6×10^{-3} %. Dissolved volumes calculated by these methods still represent insignificant amounts. Further, the grouting process used in the foundation of Crystal River Units 2 and 3 reduced the permeability of the carbonate rocks from in excess of 65,500 feet per year to less than 2,000 feet per year. With the permeability decreased by more than 30 times, exposure of the limestone to potential solvent groundwater is effectively reduced by the same factor. It is concluded that the natural solution process will not affect the structural integrity of the foundation of the CR-3 for the period of extended operation. Therefore, the analysis of the volume of bedrock solutioning has been projected to the end of the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

APPENDIX B

AGING MANAGEMENT PROGRAMS

TABLE OF CONTENTS

LIST OF TABLES

B.0 AGING MANAGEMENT PROGRAMS

B.1 INTRODUCTION

B.1.1 OVERVIEW

License Renewal aging management program (AMP) descriptions are provided in this appendix for each program credited for managing aging effects based upon the aging management review results provided in Sections 3.1 through 3.6.

Each AMP discussed in this Appendix has ten (10) program elements. These elements are defined in Appendix A.1, Section A.1.2.3, of NUREG-1800, “Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants,” Rev. 1, U. S. Nuclear Regulatory Commission, September 2005, (the SRP-LR). These elements have been incorporated into the AMPs described in Sections X and XI of NUREG-1801, “Generic Aging Lessons Learned (GALL),” Rev. 1, U.S. Nuclear Regulatory Commission, September 2005, (NUREG-1801). For those plant-specific, non-NUREG-1801, AMPs, SRP-LR guidance has been used to develop a detailed discussion of the 10 elements. Therefore, the AMP descriptions in this Appendix address the ten elements either implicitly, by means of a consistency review using the programs in NUREG-1801, or explicitly, by a comparison to the program elements in NUREG-1800.

B.1.2 METHOD OF DISCUSSION

For those AMPs whose acceptability is based on consistency with the programs in Sections X and XI of NUREG-180, each program discussion is presented in the following format:

- A summary description of the program is provided.
- A statement is made regarding consistency of the program with NUREG-1801.
- If applicable, exceptions to the NUREG-1801 program are summarized, and justifications provided.
- If applicable, enhancements to ensure consistency with NUREG-1801 are proposed. A proposed schedule for completion is discussed.
- Operating Experience information specific to the program is provided.
- A conclusion section provides a statement of reasonable assurance that the program is, or will be, effective.

For those programs that are plant-specific, the following format is followed:

- A summary description of the program is provided.
- A discussion of each of the 10 elements in the program is provided. Operating experience is one of the 10 elements.
- A conclusion section provides a statement of reasonable assurance that the program is, or will be, effective.

B.1.3 QUALITY ASSURANCE PROGRAM AND ADMINISTRATIVE CONTROLS

Three elements common to all aging management programs are corrective actions, confirmation process, and administrative controls. These elements are included in the CR-3 Quality Assurance (QA) Program that implements the requirements of 10 CFR 50, Appendix B. A description of the QA Program is provided in FSAR Section 1.7, Quality Program (Operational).

Corrective actions:

Corrective actions are implemented in accordance with procedures established to implement the Corrective Action Management Policy and requirements of 10 CFR 50, Appendix B, Criterion XVI. Conditions adverse to quality, such as, failures, malfunctions, deviations, defective material and equipment, and nonconformances, are promptly identified and corrected. In the case of significant conditions adverse to quality, measures are implemented to ensure that the cause of the nonconformance is determined and that corrective action is taken to prevent recurrence. In addition, the root cause of the significant condition adverse to quality and the corrective action implemented are documented and reported to appropriate levels of management. The Corrective Action Program is consistent with the guidelines in the appendix to Volume 2 of NUREG-1801.

Confirmation Process:

The focus of the confirmation process is on the follow-up actions that must be taken to verify effective implementation of corrective actions and preclude repetition of significant conditions adverse to quality. The Corrective Action Program includes the requirement that measures be taken to preclude repetition of significant conditions adverse to quality. These measures include actions to verify effective implementation of proposed corrective actions. The confirmation process is part of the Corrective Action Program and, for significant conditions adverse to quality, includes:

- reviews to assure proposed actions are adequate,
- tracking and reporting of open corrective actions,
- root cause determinations, and
- reviews of corrective action effectiveness.

The corrective action process is also monitored for potentially adverse trends. The existence of an adverse trend due to recurring or repetitive adverse conditions will result in the initiation of an investigation with appropriate follow-up corrective action. The CR-3 confirmation process is consistent with the appendix to Volume 2 of NUREG-1801.

Administrative Controls:

Administrative controls that govern aging management activities are established within the document control procedures that implement: (1) industry standards related to administrative controls and QA for the operational phase of nuclear power plants and (2) the requirements of 10 CFR 50, Appendix B, Criterion VI. The CR-3 administrative controls process is consistent with the appendix to Volume 2 of NUREG-1801.

B.1.4 OPERATING EXPERIENCE

Industry operating experience (OE) was incorporated into the License Renewal process through a review of industry documents to identify aging effects and mechanisms that could challenge the intended function of systems and structures within the scope of License Renewal. Review of plant-specific OE was performed to identify aging effects experienced. The review of plant-specific OE involved electronic database searches of plant information. As appropriate, discussions with system engineers were conducted to identify additional aging concerns.

OE regarding existing programs/activities, including past corrective actions resulting in program enhancements, was considered. This information provides objective evidence that the effects of aging have been, and will continue to be, adequately managed.

B.1.5 AGING MANAGEMENT PROGRAMS

The AMPs addressed in this Appendix are listed on Table B-1. Information on the table notes whether programs are either existing or new. Each AMP is addressed in the individual Subsections of Section B.2.

B.1.6 TIME-LIMITED AGING ANALYSES AGING MANAGEMENT PROGRAMS

Table B-1 also includes a listing of AMPs used to resolve Time-Limited Aging Analyses (TLAAs). Evaluation of TLAA-related AMPs in accordance with 10 CFR 54.21(c), are discussed in Section B.3.

B.2 AGING MANAGEMENT PROGRAMS

The correlation between NUREG-1801 programs and CR-3 AMPs is shown on the following table.

TABLE B-1 CORRELATION OF NUREG-1801 AND CR-3 AGING MANAGEMENT PROGRAMS

NUREG-1801 Number	NUREG-1801 Program	CR-3 Program	NUREG-1801 Comparison
NUREG-1801 Chapter XI			
XI.M1	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program See Subsection B.2.1.	Existing program consistent with NUREG-1801
XI.M2	Water Chemistry	Water Chemistry Program See Subsection B.2.2.	Existing program consistent with NUREG-1801
XI.M3	Reactor Head Closure Studs	Reactor Head Closure Studs Program See Subsection B.2.3.	Existing program consistent with NUREG-1801 with enhancement
XI.M4	BWR Vessel ID Attachment Welds	Not applicable to PWRs.	Not applicable
XI.M5	BWR Feedwater Nozzle	Not applicable to PWRs.	Not applicable
XI.M6	BWR Control Rod Drive Return Line Nozzle	Not applicable to PWRs.	Not applicable
XI.M7	BWR Stress Corrosion Cracking	Not applicable to PWRs.	Not applicable
XI.M8	BWR Penetrations	Not applicable to PWRs.	Not applicable
XI.M9	BWR Vessel Internals	Not applicable to PWRs.	Not applicable
XI.M10	Boric Acid Corrosion	Boric Acid Corrosion Program See Subsection B.2.4.	Existing program consistent with NUREG-1801
XI.M11	Nickel-Alloy Nozzles and Penetrations	Not credited for aging management.	Not applicable; see Note 1
XI.M11A	Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors	Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors Program See Subsection B.2.5.	Existing program consistent with NUREG-1801
XI.M12	Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)	Based on a thermal aging susceptibility evaluation, the applicable CASS components are not susceptible to thermal aging.	Not applicable

NUREG-1801 Number	NUREG-1801 Program	CR-3 Program	NUREG-1801 Comparison
XI.M13	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program See Subsection B.2.6.	New program consistent with NUREG-1801
XI.M14	Loose Part Monitoring	Not credited for aging management.	Not applicable
XI.M15	Neutron Noise Monitoring	Not credited for aging management.	Not applicable
XI.M16	PWR Vessel Internals (no longer an AMP in NUREG-1801, Rev. 1)	Not credited for aging management.	Not applicable; see Note 2
XI.M17	Flow-Accelerated Corrosion	Flow-Accelerated Corrosion Program See Subsection B.2.7.	Existing program consistent with NUREG-1801
XI.M18	Bolting Integrity	Bolting Integrity Program See Subsection B.2.8.	Existing program consistent with NUREG-1801 with enhancement
XI.M19	Steam Generator Tube Integrity	Steam Generator Tube Integrity See Subsection B.2.9.	Existing program consistent with NUREG-1801
XI.M20	Open-Cycle Cooling Water System	Open-Cycle Cooling Water System Program See Subsection B.2.10.	Existing program consistent with NUREG-1801 with enhancement
XI.M21	Closed-Cycle Cooling Water System	Closed-Cycle Cooling Water System Program See Subsection B.2.11.	Existing program consistent with NUREG-1801 with exceptions
XI.M22	Boraflex Monitoring	Not credited for aging management.	Not applicable
XI.M23	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	Inspection of Overhead Heavy Load and Light Load Handling Systems Program See Subsection B.2.12.	Existing program consistent with NUREG-1801 with enhancement
XI.M24	Compressed Air Monitoring	Not credited for aging management.	Not applicable
XI.M25	BWR Reactor Water Cleanup System	Not applicable to PWRs.	Not applicable
XI.M26	Fire Protection	Fire Protection Program See Subsection B.2.13.	Existing program consistent with NUREG-1801 with exceptions and enhancement
XI.M27	Fire Water System	Fire Water System Program See Subsection B.2.14.	Existing program consistent with NUREG-1801 with enhancement
XI.M28	Buried Piping and Tanks Surveillance	Not credited for aging management.	Not applicable

NUREG-1801 Number	NUREG-1801 Program	CR-3 Program	NUREG-1801 Comparison
XI.M29	Aboveground Steel Tanks	Aboveground Steel Tanks Program See Subsection B.2.15.	New program consistent with NUREG-1801
XI.M30	Fuel Oil Chemistry	Fuel Oil Chemistry Program See Subsection B.2.16.	Existing program consistent with NUREG-1801 with exceptions and enhancement
XI.M31	Reactor Vessel Surveillance	Reactor Vessel Surveillance Program See Subsection B.2.17.	Existing program consistent with NUREG-1801 with exception and enhancement
XI.M32	One-Time Inspection	One-Time Inspection Program See Subsection B.2.18.	New program consistent with NUREG-1801
XI.M33	Selective Leaching of Materials	Selective Leaching of Materials Program See Subsection B.2.19.	New program consistent with NUREG-1801 with exception
XI.M34	Buried Piping and Tanks Inspection	Buried Piping and Tanks Inspection Program See Subsection B.2.20.	New program consistent with NUREG-1801
XI.M35	One-Time Inspection of ASME Code Class 1 Small-Bore Piping	One-Time Inspection of ASME Code Class 1 Small-Bore Piping Program See Subsection B.2.21.	New program consistent with NUREG-1801
XI.M36	External Surfaces Monitoring	External Surfaces Monitoring Program See Subsection B.2.22.	Existing program consistent with NUREG-1801 with enhancement
XI.M37	Flux Thimble Tube Inspection	Not credited for aging management.	Not applicable
XI.M38	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program See Subsection B.2.23.	New program consistent with NUREG-1801
XI.M39	Lubricating Oil Analysis	Lubricating Oil Analysis Program See Subsection B.2.24.	Existing program consistent with NUREG-1801 with exception
XI.S1	ASME Section XI, Subsection IWE	ASME Section XI, Subsection IWE Program See Subsection B.2.25.	Existing program consistent with NUREG-1801
XI.S2	ASME Section XI, Subsection IWL	ASME Section XI, Subsection IWL Program See Subsection B.2.26.	Existing program consistent with NUREG-1801

NUREG-1801 Number	NUREG-1801 Program	CR-3 Program	NUREG-1801 Comparison
XI.S3	ASME Section XI, Subsection IWF	ASME Section XI, Subsection IWF Program See Subsection B.2.27.	Existing program consistent with NUREG-1801
XI.S4	10 CFR Part 50, Appendix J	10 CFR Part 50, Appendix J Program See Subsection B.2.28.	Existing program consistent with NUREG-1801
XI.S5	Masonry Wall	Masonry Wall Program See Subsection B.2.29.	Existing program consistent with NUREG-1801 with enhancement
XI.S6	Structures Monitoring	Structures Monitoring Program See Subsection B.2.30.	Existing program consistent with NUREG-1801 with enhancement
XI.S7	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants	Not credited for aging management.	Not applicable
XI.S8	Protective Coating Monitoring and Maintenance	Not credited for aging management.	Not applicable
XI.E1	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program See Subsection B.2.31.	New program consistent with NUREG-1801
XI.E2	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program See Subsection B.2.32.	New program consistent with NUREG-1801
XI.E3	Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program See Subsection B.2.33.	New program consistent with NUREG-1801
XI.E4	Metal Enclosed Bus	Metal Enclosed Bus Program See Subsection B.2.34.	New program consistent with NUREG-1801
XI.E5	Fuse Holders	Fuse Holder Program See Subsection B.2.35.	New program consistent with NUREG-1801 with exceptions
XI.E6	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program See Subsection B.2.36.	New program consistent with NUREG-1801 with exception

NUREG-1801 Number	NUREG-1801 Program	CR-3 Program	NUREG-1801 Comparison
NUREG-1801 Chapter X			
X.M1	Metal Fatigue of Reactor Coolant Pressure Boundary	Reactor Coolant Pressure Boundary Fatigue Monitoring Program See Subsection B.3.1.	Existing program consistent with NUREG-1801
X.E1	Environmental Qualification (EQ) of Electric Components	Environmental Qualification (EQ) Program See Subsection B.3.2.	Existing program consistent with NUREG-1801
Plant-Specific			
None	Not applicable	Carborundum (B_4C) Monitoring Program See Subsection B.2.37.	Not applicable - Plant-Specific
None	Not applicable	High-Voltage Insulators in the 230KV Switchyard Program See Subsection B.2.38.	Not applicable - Plant-Specific

Notes:

1. CR-3 has provided in the FSAR Supplement a commitment to comply with applicable NRC Orders and to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.

2. CR-3 has provided in the FSAR Supplement a commitment to: (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.

B.2.1 ASME SECTION XI, INSERVICE INSPECTION, SUBSECTIONS IWB, IWC AND IWD PROGRAM

Program Description

The American Society of Mechanical Engineers (ASME) Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program consists of periodic volumetric, surface, and/or visual examination, and leakage testing of Class 1, 2, and 3 pressure retaining components and their integral attachments to detect degradation of components and determine appropriate corrective actions. The Program Plan for the Fourth 10-Year interval at CR-3 has been developed and prepared to meet the ASME Code, Section XI, 2001 Edition with addenda through 2003.

NUREG-1801 Consistency

The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program is an existing program consistent with NUREG-1801, Section XI.M1.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

CR-3 OE includes cracking of HPI Nozzles/Thermal Sleeves. Cracking was initially detected in a weld in the safe end/thermal sleeve region of the normal duty makeup line. Investigation as to the cause of cracking identified concerns with the design/installation of the existing thermal sleeves. Corrective actions included the replacement of all four of the thermal sleeves with a modified design. Follow-up actions include a commitment to perform nondestructive examination to confirm nozzle and thermal sleeve integrity during selected refueling outages. These inspections have been integrated into the CR-3 4th interval ISI Program. Notably, these small-bore Class 1 lines would ordinarily be subject to a sampling based verification of integrity under the CR-3 One-Time Inspection of ASME Code Class 1 Small-Bore Piping Program. Since cracking has already been detected in these lines, they will not be included in sample populations under this program, but rather will default to the defined inspection schedule in the CR-3 Section XI Program.

A search of ISI program results from the third inspection interval was conducted and provides evidence that the CR-3 ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program is effective in identifying aging effects and is critically monitored, effective, and continually improving. Inspection findings from this interval include:

- A CRDM Motor Housing had a rejectable indication and was replaced.
- An unacceptable UT indication was found on CRDM Nozzle #32. A nozzle repair was required.
- A rejectable exam result for OTSG B lower inspection cover flange bolting was reported. The bolting was removed and visually examined with satisfactory results.

The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program is implemented and maintained in accordance with the general requirements for engineering programs. This provides assurance that the Program is effectively implemented to meet regulatory, process, and procedure requirements, including periodic reviews; qualified personnel are assigned as program managers and are given authority and responsibility to implement the Program; and adequate resources are committed to Program activities.

Conclusion

Implementation of the CR-3 ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program provides reasonable assurance that applicable aging effects will be managed such that the ISI Class 1, 2, and 3 components within the scope of License Renewal will continue to perform their intended functions consistent with the current licensing basis (CLB) for the period of extended operation.

B.2.2 WATER CHEMISTRY PROGRAM

Program Description

To mitigate aging effects on component surfaces that are exposed to water as a process fluid, chemistry programs are used to control water chemistry for impurities (e.g., dissolved oxygen, chlorides, fluorides, and sulfates) that accelerate corrosion and cracking. This Program relies on monitoring and control of water chemistry to keep peak levels of various contaminants below the system-specific limits. Alternatively, chemical agents, such as corrosion inhibitors, oxygen scavengers, and biocides, may be introduced to prevent certain aging mechanisms. The CR-3 Water Chemistry Program is currently based on the latest version of the Electric Power Research Institute (EPRI) guidelines. The CR-3 Water Chemistry Program will be updated as revisions to the guidelines are released.

NUREG-1801 Consistency

The Water Chemistry Program is an existing program that is consistent with NUREG-1801, Section XI.M2.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The EPRI guideline documents have been developed based on plant experience and have been shown to be effective over time with their widespread use in the industry. However, the potential for SCC exists due to inadvertent introduction of contaminants into the primary coolant system from unacceptable levels of contaminants in the boric acid, introduction through the free surface of the spent fuel pool (which can be a natural collector of airborne contaminants), or introduction of oxygen during cooldown. Ingress of demineralizer resins into the primary system has caused IGSCC of Alloy 600 vessel head penetrations. Inadvertent introduction of sodium thiosulfate into the primary system has caused IGSCC of steam generator tubes. The SCC has occurred in safety injection lines, charging pump casing cladding, instrument nozzles in safety injection tanks, and stainless steel piping systems that contain oxygenated, stagnant, or essentially stagnant borated coolant. Steam generator tubes and plugs and Alloy 600 penetrations have experienced primary water stress corrosion cracking. Steam generator tubes have experienced SCC, intergranular attack, wastage, and pitting.

Carbon steel support plates in steam generators have experienced general corrosion. The steam generator shell has experienced pitting and stress corrosion cracking.

CR-3 has reviewed the industry OE related to maintenance of a benign environment described in NUREG-1801 to ensure that applicable recommendations have been captured.

Progress Energy has performed five assessments of the CR-3 Water Chemistry Program from 2001 through 2007. These assessments have identified issues and weaknesses to be addressed through the Corrective Action Program.

Nuclear Condition Reports (NCRs) for the Environmental and Chemistry Unit at CR-3 were reviewed for the period from June, 2001 to March, 2008. These NCRs were searched for items related to chlorides, fluorides, sulfates, oxygen, etc. or programmatic deficiencies. There were instances related to increases in contaminants due to equipment issues. However, trending data for these contaminants indicate that for the vast majority of the time the levels were well below the threshold for age related degradation. Specific examples of OE include:

- During startup from a recent refueling outage, CR-3 experienced high dissolved oxygen levels in the Pressurizer water space. Pressurizer oxygen levels per procedure are required to be below 100 ppb when the Pressurizer temperature exceeds 250°F. During plant heatup, as expected the Pressurizer temperature reached 250°F. Pressurizer water space oxygen levels were measured and eventually increased to greater than 2000 ppb before returning to less than 100 ppb. Pressurizer water space oxygen levels again increased to greater than 2000 ppb but were returned to less than 100 ppb.

  During an outage, when the RCS/Pressurizer are drained to lower levels and/or opened for maintenance, oxygen ingress into the system is inevitable. Oxygen is removed from the RCS and Pressurizer through controlled system venting and hydrazine additions during the startup process. During the outage, substantial welding occurred on Pressurizer penetrations associated with the Alloy 600 mitigation project. This evolution introduced significantly higher levels of oxygen into the Pressurizer than during a normal outage. Much more of the Pressurizer was open to atmosphere allowing more oxygen to eventually become trapped in the Pressurizer.

  The apparent cause was not performing sufficient venting of the Pressurizer during startup from the outage. Although normal venting occurred, it proved insufficient. No additional venting of the Pressurizer occurred to compensate for the additional oxygen that had been introduced. A contributing cause was that the hydrazine addition to the Pressurizer was performed in accordance with chemistry procedure guidance, but it proved insufficient as oxygen levels initially were reduced within the Pressurizer but returned to elevated levels once further plant heatup commenced.

Corrective actions included a revision to an operating procedure to include reinforcing information regarding the importance of venting the Pressurizer during startup and a revision to a chemistry procedure to include additional guidance for hydrazine additions to Pressurizer when the Pressurizer has been opened for extensive maintenance.

- The deaerator outlet is the Mode 1, greater than 15% power, feedwater dissolved oxygen monitoring point. This point is selected due to the lower temperature of the water and the shorter sample transport time which results in less hydrazine/dissolved oxygen reaction than at the outlet of feedwater heaters where the feedwater is hotter and the sample transport time is longer. When the turbine was placed on line, the deaerator outlet dissolved oxygen concentration was greater than 3 ppb and remained greater than 3 ppb until just after feedwater pump 1B was placed into service. During this time, the feedwater dissolved oxygen concentration was in the chemistry procedure Action Level 1 range (greater than 3 ppb but less than 10 ppb) for a total of 21 minutes. The feedwater dissolved oxygen concentration was in the chemistry procedure Action Level 2 range (greater than or equal to 10 ppb) for a total of 8 hours 27 minutes. The feedwater dissolved oxygen concentration was returned to specification well within the Action Level 1 timeframe of one week and also well within the Action Level 2 timeframe of 100 hours.

The CR-3 Water Chemistry Program is currently based on the latest version of the EPRI guidelines. EPRI periodically updates the water chemistry guidelines, as new information becomes available. The CR-3 Water Chemistry Program will be updated as revisions to the guidelines are released, to develop a more proactive program that minimizes age-related degradation.

The OE review of the CR-3 Water Chemistry Program concluded that this Program is upgraded based on industry experience and research. These continuous improvements assure the capability of the CR-3 Water Chemistry Program to support the safe operation of CR-3 throughout the extended period of operation.

Conclusion

The continued implementation of the CR-3 Water Chemistry Program provides reasonable assurance that the applicable aging effects will be managed so that the systems and components within the scope of this Program will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.3 REACTOR HEAD CLOSURE STUDS PROGRAM

Program Description

The CR-3 Reactor Head Closure Studs Program is an inspection program which manages cracking and loss of material for the Reactor Vessel Closure Head Stud Assembly. In addition to the condition monitoring elements of the Program, the CR-3 Reactor Head Closure Studs Program includes certain preventive measures recommended by Regulatory Guide (RG) 1.65, "Material and Inspection for Reactor Vessel Closure Studs." This aging management Program is implemented primarily through the plant Inservice Inspection (ISI) Program. The Closure Head Stud Assembly comprises the studs, nuts, and washers that are inspected under the CR-3 ISI Program.

The inspection schedule is in accordance with ASME B&PV Code, Section XI, IWB-2400, and the extent and frequency is in accordance with Table IWB-2500-1, Examination Category B-G-1. This will ensure that aging effects will be discovered and repaired before loss of intended function. Examination results are evaluated according to IWB-3100. Acceptance standards are identified in IWB-3400 and IWB-3500. In addition to the examinations performed under the CR-3 ISI Program, the CR-3 Reactor Head Closure Studs Program also credits Code required visual VT-2 examinations which are conducted to detect leaks during system pressure or functional tests. Repair and replacement are performed in conformance with the requirements of IWA-4000.

The CR-3 Reactor Head Closure Studs Program includes inspections that provide reasonable assurance that the effects of cracking and loss of material would be identified prior to loss of intended function. The preventive measures include using a manganese base phosphate coating, avoiding the use of metal-plated stud bolting, and avoiding the use of lubricants that contain molybdenum disulfide.

NUREG-1801 Consistency

The CR-3 Reactor Head Closure Studs Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.M3.

Exceptions to NUREG-1801

None.

Enhancements

<u>Program Elements Affected</u>

- **Preventive Actions**
  The CR-3 Reactor Head Closure Studs Program will be enhanced to select an

alternate lubricant that is compatible with the fastener material and the contained fluid.

Operating Experience

A review of plant-specific OE did not identify cracking or loss of material for the CR-3 Closure Head Stud Assembly. The Inservice Inspection Summary Reports for Interval 3 were reviewed, and there have been no aging effects identified that have been attributed to wear or stress-corrosion cracking. Assessments of the Inservice Inspection Program from February 2000 through September 2007 were reviewed. The assessments indicate that the Inservice Inspection Program is effective in executing its requirements and programmatic deficiencies are identified and corrected in a timely fashion.

A review of plant-specific OE did not identify cracking or loss of material for the CR-3 Closure Head Stud Assembly. The 3rd Interval Inservice Inspection Summary Reports were reviewed and the inspection results were acceptable. Recent assessments of the Inservice Inspection/Inservice Testing (ISI/IST) Programs yielded the following results:

- The CR-3 Nuclear Assessment Section performed a focused review of the Ten-Year ISI Project. This review was accomplished using performance-based techniques including technical reviews/analysis in accordance with plant procedures.

  One issue identified was that some key project attributes required for successful completion of the Ten Year ISI project had not been implemented. The corrective action to prevent recurrence was to establish a recurring outage milestone for the project sponsor and to verify that the expectations are understood. This corrective action has been completed.

- Another assessment of the ISI/IST Programs was performed in 2007. Based on observations, document reviews, and personnel interviews conducted during the assessment, the CR-3 ISI/IST Programs was effectively executing the requirements in the areas assessed. However, two weaknesses were identified:
  - Expectations were not clear for the online Non-Destructive Examination (NDE) inspections to ensure consistency in processing design versus inservice deficiencies for plant equipment.
  - Benchmarking activities on some of the Program Health Reports were not documented as directed by procedure.

The following corrective actions to prevent occurrence were taken:

- Create and implement Procedural guidance for NDE.
- Provide training to increase the proficiency of personnel in performing and documenting benchmark activities.

As identified in NUREG-1801, industry OE includes cracking in BWR pressure vessel head studs. NUREG-1801 is based on industry OE through January 2005. Recent industry OE has been reviewed for applicability and no other industry OE has been identified as a result of this review. Any relevant new industry OE will be captured through the normal OE review process where it is screened for applicability. This process will continue through the period of extended operation.

Conclusion

The CR-3 Reactor Head Closure Studs Program is a condition monitoring program implemented primarily with the CR-3 Inservice Inspection Program per the requirements of the ASME Code, Section XI, Subsection IWB and includes certain preventive measures recommended by RG 1.65. Based on the evaluation of this Program, there is reasonable assurance that the CR-3 Reactor Head Closure Studs Program will adequately manage cracking and loss of material for the Reactor Vessel Closure Head Stud Assembly so that applicable intended functions will be maintained consistent with the CLB for the period of extended operation.

B.2.4 BORIC ACID CORROSION PROGRAM

Program Description

The Boric Acid Corrosion Program implements systematic measures to ensure that leaking borated coolant does not lead to the degradation of the leakage source or adjacent mechanical, electrical and structural components susceptible to boric acid corrosion. The Program consists of: (1) visual inspection of external surfaces that are potentially exposed to borated water leakage, (2) timely discovery of leak path and removal of the boric acid residues, (3) assessment of the damage, and (4) follow-up inspection for adequacy of corrective actions. The Boric Acid Corrosion Program includes plant-specific reactor coolant pressure boundary (RCPB) boric acid leakage identification and inspection procedures to ensure that leaking borated coolant does not lead to degradation of the leakage source or adjacent structures, and provides assurance that the RCPB will have an extremely low probability of abnormal leakage, rapidly propagating failure, or gross rupture. The Program was developed in response to the recommendations of NRC Generic Letter 88-05.

NUREG-1801 Consistency

The Boric Acid Corrosion Program is an existing program consistent with NUREG-1801, Section XI.M10.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The Boric Acid Corrosion Program is implemented and maintained in accordance with the general requirements for engineering programs. This provides assurance that the Boric Acid Corrosion Program is effectively implemented to meet regulatory, process, and procedure requirements, including periodic assessments and review of OE; qualified personnel are assigned as program managers and are given authority and responsibility to implement the Program; and adequate resources are committed to Program activities.

A review of responses to NRC generic correspondence, plant condition reports, and inspections was conducted and showed the CR-3 Boric Acid Corrosion Program to be critically monitored and continually improving. Specific examples of OE include:

- While performing a Boric Acid Corrosion Program inspection which involved cleaning the boric acid residue from the packing of the valve being inspected, semi-wet boric acid leakage was observed leaking outside the packing gland and dripping down on the process piping and the floor. This constituted an active leak and an NCR was initiated. There was no observed component corrosion or degradation since the affected components were constructed of stainless steel. A drip bag was installed to prevent further contamination of the floor. A work request was implemented to stop the leak and clean the area. There was no further leakage observed.

- A Swagelok fitting was found to be leaking at the rate of 2 drops per minute. This was considered to be an active leak and an NCR was initiated with a work request to tighten the fitting. An engineering assignment was initiated to perform the Boric Acid Corrosion Program evaluation. The tasks were performed as required and the leak stopped.

Based on these results, the OE review provides evidence that the Boric Acid Corrosion Program practices will continue to assure the integrity of the subject components.

Conclusion

Implementation of the Boric Acid Corrosion Program will provide reasonable assurance that applicable aging effects will be managed such that the components susceptible to boric acid corrosion within the scope of License Renewal will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.5 NICKEL-ALLOY PENETRATION NOZZLES WELDED TO THE UPPER REACTOR VESSEL CLOSURE HEADS OF PRESSURIZED WATER REACTORS PROGRAM

Program Description

Since the issuance of NRC Generic Letter 97-01, CR-3 has been an active participant in industry initiatives relating to Alloy 600 and the specific issue of degradation of Vessel Head Penetration (VHP) nozzles. Since GL 97-01, additional OE identified occurrences of circumferential cracking in VHP nozzles. This resulted in the issuance of NRC Bulletin 2001-01 which required CR-3 to evaluate the VHP nozzles for susceptibility.

Subsequently, NRC Bulletins 2002-01 and 2002-02 were issued as a result of several cracked and leaking Alloy 600 VHP nozzles within the industry including the degradation of the reactor pressure vessel head at Davis-Besse. In response to the referenced NRC Bulletins, CR-3 provided additional assurance that the plant programs are adequate to prevent degradation as observed in the industry.

On February 11, 2003, NRC Order EA-03-009 was issued to establish interim inspection requirements for Reactor Pressure Vessel (RPV) Heads at Pressurized Water Reactors. Subsequently, First Revised NRC Order EA-03-009 was issued on February 20, 2004 to revise certain inspection aspects of the original Order. The Order (as amended) resulted in changes to the CR-3 program for managing cracking in the VHP nozzles. The Order (as amended) provided requirements for determining a susceptibility ranking, and mandated inspection requirements commensurate with the plant's susceptibility ranking. The RPV head was replaced in the Fall of 2003. The replacement RPV head has been designed to minimize the concerns for Control Rod Drive Mechanism (CRDM) nozzle cracking and leakage associated with Primary Water Stress Corrosion Cracking (PWSCC) of the Alloy 600 nozzle material. Alloy 690 base and weld material was used for the CR-3 CRDM nozzles on the replaced RPV head. As described in NRC Order EA-03-009, CR-3 is in susceptibility category "Replaced."

In accordance with Section IV-C-(4) of the Order, for those plants in the "Replaced" susceptibility category, no RPV head and head penetration nozzle inspections were required during the outage in which the RPV head was replaced.

Beginning with initial service, until the replacement RPV head reaches 8 Effective Degradation Years, RPV head and head penetration nozzle inspections are performed as follows:

- An inspection meeting the requirements of paragraph IV.C.(5)(a)[bare metal visual inspection] must be completed at least every third refueling outage or every five (5) years, whichever occurs first.

- The requirements of paragraph IV.C.(5)(b)[non-destructive (NDE) examination] must be completed at least every four (4) refueling outages or every seven (7) years, whichever occurs first.

Since CR-3 is on 24-month fuel cycles, the inspection frequency expressed in years is the most limiting.

The CR-3 Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors Program is implemented through the plant Inservice Inspection (ISI) Program by the use of augmented inspections.

NUREG-1801 Consistency

The CR-3 Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors Program is an existing plant program that is consistent with NUREG-1801, Section XI.M11A.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

During Refueling Outage 10 (February 1996), CR-3 performed a 100% bare metal detailed inspection through the access ports. Boron was noted on the reactor vessel head (RVH) attributed to leaking CRDM flanges. Also various RVH cleaning activities were performed through the access ports. Note that CR-3 had an extended shutdown from September 1996 through February 1998.

During Refueling Outage 11 (October 1999), CR-3 performed a visual inspection for evidence of leakage at the "mouse hole" access openings with no leakage observed. However, experience from Oconee Nuclear Stations and Arkansas Nuclear One Unit 1 had indicated that the expected leakage resulting from a through-wall leak of a CRDM nozzle would yield very small quantities of boric acid residue which would not typically be visible from the mouse holes without additional inspection equipment.

During Refueling Outage 12, CR-3 proceeded to implement the planned visual inspection and subsequent repair activities as committed to in the CR-3 response to NRC Bulletin 2001-01. A bare metal visual inspection of the 69 RVH to CRDM nozzle interfaces was performed. The inspectors were VT-2 qualified with special qualifications and training related to CRDM nozzle leakage observation. The special qualifications and training used industry OE and images of leaking nozzles to sensitize inspectors to the type and quantity of boric acid crystal deposits indicative of CRDM through-wall leaks experienced at Oconee Nuclear Stations and Arkansas Nuclear One.

The results of the visual inspection indicated that there was one nozzle with a potential through-wall crack based on boric acid crystal accumulation. As a result of the visual inspection, the CRDM mounted on the affected nozzle was removed to support an ultrasonic test examination (UT) of the CRDM nozzle base material. The UT data indicated the presence of five recordable indications including two axially oriented cracks (flaw 3 and 4) that were through-wall, and extended from the bottom of the nozzle through and above the J-groove weld. These cracks originated at the weld-to-nozzle interface, propagated downward to the end of the nozzle, and upward through the weld into the annular space between the nozzle and the head. These two axial cracks were the source of leakage. These two cracks were then joined circumferentially (flaw 5) on the OD of the nozzle above the weld. The circumferential crack (flaw 5) above the weld extended about 90° and was approximately 50% through-wall. The UT identified one circumferential crack (flaw 1) below the weld. Flaw 1 extended for about 30° and was within 0.15 inch of the inside diameter (ID) (i.e., approximately 75% through-wall). Flaw 2 extended for about 195° and was through-wall. Note that flaw 2 had both axial and circumferential characteristics, extending from below the weld, through the weld and above the weld. The largest portion of the flaw was below the weld (approx. 130°). All five cracks were outside diameter (OD) initiated. No dye penetrant test (PT) of the J-groove weld was required since through-wall cracking of the nozzle base material was confirmed.

As provided in the CR-3 response to NRC Bulletin 2001-01, since through-wall cracking of CRDM nozzle #32 was confirmed by UT, an extent of condition of the cracking was performed using UT on eight nozzles where CRDMs were removed to facilitate nozzle repair or removed for CRDM replacement. The results of the additional UTs indicated that there was no cracking of the eight CRDM nozzles inspected. The eight locations selected provided reasonable assurance of bounding the extent of condition.

The UT results from the extent of condition examinations support the effectiveness of the visual inspection and the fact that accumulation of boric acid crystals did not impact the ability to discriminate between active CRDM nozzle leakage and other sources of leakage. The initial visual inspection and UT performed for extent of condition were in keeping with the commitment provided in the CR-3 response to NRC Bulletin 2001-01.

The CR-3 RVH was replaced in the Fall of 2003. In accordance with NRC Order EA-03-009, Paragraph IV.C(5)(a), the RVH was inspected during Refueling Outage 15. A bare metal visual examination was performed on 100 percent of the RPV head surface including 360° around each RPV head penetration nozzle. No evidence of boron or corrosive product was identified. A white flakey substance was observed on the surface of the head. The material was soft and non-adhering. A chemical analysis was performed on the substance, and it was determined not to be boron. This substance has been previously identified as originating from the head insulation package from above. Photographs were taken to document the discovery.

Conclusion

The CR-3 Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors Program meets the mandatory requirements of NRC Order EA-03-009 (as amended). The current requirements are based upon a “replaced” susceptibility ranking; however, the ranking is periodically re-calculated per the requirements of the Order to incorporate actual plant operating data. Based on the evaluation of the Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors Program, there is reasonable assurance that the Program will continue to adequately manage cracking in the VHP nozzles due to PWSCC so that system intended functions will be maintained consistent with the CLB for the period of extended operation.

B.2.6 THERMAL AGING AND NEUTRON IRRADIATION EMBRITTLEMENT OF CAST AUSTENITIC STAINLESS STEEL (CASS) PROGRAM

Program Description

The CR-3 Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program will be implemented as an augmented Inservice Inspection (ISI) Program to detect the effects of loss of fracture toughness due to thermal aging and/or neutron irradiation embrittlement of CASS reactor vessel internals. These inspections will be performed as augmented inspections to visual inspections already required by American Society of Mechanical Engineers (ASME) Code Section XI, Subsection IWB, Category B-N-3. Components within the scope of this augmented inspection Program include CASS reactor vessel internals components that have been determined to be potentially susceptible to thermal aging and/or are subjected to neutron fluence of greater than 10^{17} n/cm^2 (E > 1 MeV). Susceptibility to loss of fracture toughness due to thermal embrittlement is determined based on the criteria set forth in the May 19, 2000 letter from Christopher Grimes, Nuclear Regulatory Commission (NRC), to Mr. Douglas Walters, Nuclear Energy Institute (NEI). For components deemed susceptible to loss of fracture toughness due to thermal embrittlement and/or neutron irradiation embrittlement, the Program allows for a component-specific evaluation, including a mechanical loading assessment to determine if the loading is compressive or low enough to preclude fracture. The Program evaluations and inspections will consider the recommendations of NUREG-1801, Section XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)."

The Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program will manage loss of fracture toughness due to thermal aging and/or neutron irradiation embrittlement in CASS reactor vessel internals components within the scope of License Renewal such that the system intended function is maintained through the extended period of operation. This Program will be implemented and required inspections completed and evaluated during the last 10-year ISI Interval prior to the period of extended operation. Inspections on potentially susceptible components will continue during the period of extended operation.

NUREG-1801 Consistency

The Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program is a new program that is consistent with NUREG-1801, Section XI.M13.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

This is a new program for Thermal Aging and Neutron Irradiation Embrittlement of CASS. There is no existing site-specific OE to validate the effectiveness of this Program at CR-3.

NUREG-1801 is based on industry OE through January 2005. Recent industry OE has been reviewed for applicability. More recent OE is captured through the normal OE review process where it is screened for applicability. This process will continue through the period of extended operation.

Conclusion

The Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program includes augmented inspections which will be implemented as part of the CR-3 ISI Program. Based on the evaluation of this Program, there is reasonable assurance that, when implemented, the Program will adequately manage loss of fracture toughness so that system intended functions will be maintained consistent with the CLB for the period of extended operation.

B.2.7 FLOW-ACCELERATED CORROSION PROGRAM

Program Description

The Flow-Accelerated Corrosion (FAC) Program provides for prediction, detection, and monitoring of FAC in plant piping and other piping components so that timely and appropriate action may be taken to minimize the probability of experiencing a FAC-induced consequential leak or rupture. The FAC Program is based on the guidance provided in NSAC-202L, “Recommendations for an Effective Flow-Accelerated Corrosion Program,” and includes conducting an analysis to determine critical locations, performing limited baseline inspections to determine the extent of thinning at these locations, performing follow-up inspections to confirm the predictions, and repairing or replacing the components as necessary.

NUREG-1801 Consistency

The FAC Program is an existing program consistent with NUREG-1801, Section XI.M17.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

Nuclear power plants have experienced pipe wall thinning in single-phase and two-phase high-energy piping systems which has been largely attributable to FAC. Specific CR-3 examples of OE include:

- Several components in the secondary plant systems have low margin to the limiting acceptance criteria and continue to experience FAC degradation. These components will require more frequent inspection, and will eventually require replacement.

- CR-3 FAC personnel attended the January 2008 CHECWORKS User Group meeting in which a presentation was made on the FAC entrance effect. EPRI Report TR1015072, "Flow-Accelerated Corrosion – The Entrance Effect," issued in November 2007, as well as the report recommendations, were discussed. In addition, utility representatives shared OE and new techniques for measuring wall thickness. This benchmarking OE demonstrates that CR-3 is staying abreast of FAC best practices.

The CR-3 FAC Program is based on NSAC-202L, and has evolved through monitoring of industry experience. The Program has been effective in its response to both industry and site-specific OE and provides an effective means of ensuring the structural integrity of high-energy carbon steel systems.

The NRC has audited industry programs based on the EPRI methodology at several plants and has determined that these activities can provide a good prediction of the onset of FAC so that timely corrective actions can be undertaken.

Conclusion

The Flow-Accelerated Corrosion Program provides reasonable assurance that wall thinning aging effects in piping components are adequately managed so that system intended functions will be maintained consistent with the current licensing basis for the period of extended operation.

B.2.8 BOLTING INTEGRITY PROGRAM

Program Description

The Bolting Integrity Program addresses aging management requirements for bolting on mechanical components within the scope of License Renewal. The CR-3 Bolting Integrity Program utilizes industry recommendations and EPRI guidance that considers material properties, joint/gasket design, chemical control, service requirements, and industry and site OE in specifying torque and closure requirements. The Program relies on recommendations for a Bolting Integrity Program, as delineated in NUREG-1339, "Resolution of Generic Safety Issue 29: Bolting Degradation or Failure in Nuclear Power Plants," and industry recommendations, as delineated in EPRI reports NP-5769, “Degradation and Failure of Bolting in Nuclear Power Plants,” and TR-104213, “Bolted Joint Maintenance & Applications Guide,” for pressure retaining bolting within the scope of License Renewal. Safety related bolting and closures inspections, monitoring/trending, and repair/replacement is performed under the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program. In addition, both safety related and non-safety related pressure retaining bolting and closures inspection is performed under the External Surfaces Monitoring Program. The Program includes periodic inspections of high-strength structural bolting for cracking due to SCC. Degraded conditions are also subject to the Corrective Action Program.

NUREG-1801 Consistency

The Bolting Integrity Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section X1.M18.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the below-listed enhancement will be implemented:

<u>Program Elements Affected</u>

- **Scope of Program**
  The Bolting Integrity Program procedures will include guidance for torquing and closure requirements based on the EPRI documents endorsed by NUREG-1801.

- **Preventive Actions**
  1) The Bolting Integrity Program will identify and remove instances where

molybdenum disulfide lubricant is allowed for use in bolting applications in specific procedures and will add a specific prohibition against use of molybdenum disulfide lubricants in the CR-3 procedure for bolted connections.

2) The Bolting Integrity Program procedures will include guidance for torquing and closure requirements that include proper torquing of bolts and checking for uniformity of gasket compression after assembly.

3) The Bolting Integrity Program procedures will include guidance for torquing and closure requirements based on the guidance of EPRI 5067, "Good Bolting Practices, A Reference Manual for Nuclear Power Plant Personnel," Volumes I and II.

- **Parameters Monitored/Inspected**
  The Bolting Integrity Program will include periodic ultrasonic testing (UT) examination of a representative sample of bolting identified as potentially having actual yield strength >150 ksi.

- **Detection of Aging Effects**
  1) The CR-3 Bolting Integrity Program will include a centralized procedure based on EPRI-5067 and will incorporate guidance regarding bolted joint leak tightness and pre-installation inspections consistent with the recommendations of this document.

  2) The Bolting Integrity Program will include periodic examination of a representative sample of bolting identified as potentially having actual yield strength >150 ksi. The Bolting Integrity Program includes periodic in situ UT examinations of these bolts for SCC. Alternately, bolting may be removed for surface examinations or replaced.

- **Monitoring and Trending**
  Examination of NSSS support high strength bolting for SCC will be performed concurrent with examinations of the associated supports with a minimum frequency of once per 10-year inservice inspection period.

- **Corrective Actions**
  1) The Bolting Integrity Program procedures will include guidance for torquing and closure requirements based on the recommendations of EPRI NP-5769, Volumes 1 and 2.

  2) Acceptance standards for examination of high strength structural bolting will utilize acceptance standards consistent with the recommendations of EPRI NP-5769.

Operating Experience

A review of plant specific OE associated with bolting has identified instances of leakage of bolted connections. Deficiencies noted include use of incorrect gasket material in flanged connections, and loss of preload resulting from relaxation of heat exchanger joints. Corrective actions were prescribed to address the application, including generic guidance in plant program documents as appropriate. Notably, the CR-3 Bolting Integrity Program includes an enhancement to provide centralized torquing and bolting procedures based on EPRI-5067 that will incorporate uniform guidance regarding gasket selection, bolted joint leak tightness and preinstallation inspections.

A review of current bolting practices found identified that molybdenum disulfide continues to be used in limited applications at CR-3, including applications in the primary system. While this thread compound has good lubrication properties on initial installation, industry OE has associated its use with the potential for stress corrosion cracking. Stress corrosion cracking of bolting using this compound has not been identified in CR-3 OE; nonetheless, the Bolting Integrity Program is being enhanced to discontinue its use.

The OE review shows that the CR-3 Bolting Integrity Program is continually upgraded based on industry experience, research, and routine program performance. The Program, through its continual improvement, assures the capability of mechanical bolting to support the safe operation of CR-3 throughout the extended period of operation.

Conclusion

Implementation of the CR-3 Bolting Integrity Program, with the enhancements identified above, will provide reasonable assurance that aging effects will be managed so that the systems and components within the scope of this Program will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.9 STEAM GENERATOR TUBE INTEGRITY PROGRAM

Program Description

The Steam Generator Tube Integrity Program is performed as part of the overall Steam Generator Integrity Program. The Steam Generator Tube Integrity Program is credited for aging management of the tubes, tube plugs, sleeves, tube supports, and the secondary-side components whose failure could prevent the steam generator from fulfilling its intended safety function. The Steam Generator Integrity Program is based on Technical Specification requirements, and meets the intent of NEI 97-06, "Steam Generator Program Guidelines."

The Steam Generator Tube Integrity Program manages aging effects by providing a balance of prevention, inspection, evaluation, repair, and leakage monitoring. Preventative measures are intended to mitigate degradation related to corrosion phenomena via primary-side and secondary-side water chemistry monitoring and control. Foreign material exclusion requirements are intended to inhibit wear degradation. The Steam Generator Tube Integrity Program provides the actions to be taken in response to finding foreign objects.

The Steam Generator Tube Integrity Program provides the requirements for inspection activities for the detection of flaws in tubing, plugs, sleeves, tube supports, and secondary-side internal components needed to maintain tube integrity. Degradation assessments identify both potential and existing degradation mechanisms. Inservice inspections (i.e., eddy current testing and visual inspections) are used for the detection of flaws. Condition monitoring compares the inspection results against performance criteria, and an operational assessment provides a prediction of tube conditions to ensure that the performance criteria will not be exceeded during the next operating cycle. Primary-to-secondary leakage is continually monitored during operation.

The steam generators at CR-3 are scheduled to be replaced in 2009.

NUREG-1801 Consistency

The Steam Generator Integrity Program is an existing program consistent with NUREG-1801, Section XI.M19.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The Steam Generator Integrity Program is implemented and maintained in accordance with the general requirements for engineering programs. This provides assurance that the Program meets regulatory, process, and procedure requirements; that qualified personnel are assigned as program managers and are given authority and responsibility to implement the Program; and that adequate resources are committed to Program activities.

The Steam Generator Integrity Program utilizes OE to promote the identification and transfer of lessons learned from both internal and industry events so that the knowledge gained can be used to improve nuclear plant safety and operations. Operating experience provides the methodology for receiving, processing, status reporting, screening, reviewing, evaluating, and taking preventive and corrective actions in response to OE information.

A review of NRC Generic Letters found that CR-3 steam generator tube inspection activities are consistent with NRC positions. Additionally, CR-3 has submitted an application for improved Technical Specifications consistent with NRC and industry adoption of improved steam generator Technical Specifications. Adoption of the improved Technical Specification requirements has been approved by the NRC. In addition, NRC Information Notices and Licensee Event Reports were reviewed for applicability to CR-3. Although all the OE was not directly applicable to the CR-3 steam generators, the underlying aging mechanisms were also reviewed and were found to be addressed by the CR-3 Steam Generator Tube Integrity Program. Also, INPO OE reports were reviewed for applicability to the CR-3 Steam Generator Tube Integrity Program. For those events that were directly related to the CR-3 steam generators, it was found that the CR-3 Steam Generator Tube Integrity Program addressed the concerns identified. For those events that were not directly related to the CR-3 steam generators, the underlying aging mechanisms were also reviewed. The aging mechanisms associated with the INPO OE were found to be addressed by the CR-3 Steam Generator Tube Integrity Program.

Examples of plant-specific OE include the following items:

- <u>Crack Indications in Steam Generator Alloy 600 Rolled Plugs (INPO OE)</u>: CR-3 uses a rotating coil probe to inspect 100% of the Alloy 600 rolled plugs in the hot and cold legs of OTSGs. OTSGs have previously experienced Alloy 600 rolled plug cracking, but the problems appeared to be confined to certain susceptible material heats. CR-3 did not have any of the susceptible plug material heats and had not found any crack indications in previous inspections. CR-3 normally inspects 100% of the existing Alloy 600 rolled plugs. Two of the four plugs with crack indications were found on the cold leg end of the tube. While it was expected that the plugs could develop cracks over time due to the material, they were not expected to occur on the cold leg end in this time frame based on vendor calculations The crack indications were all axially orientated and on the "heel" (non-pressure boundary) side of the rolled joint. The cause for the crack indications was determined to be the use of Alloy 600 material for the rolled plugs. Corrective actions included the repair of the four plugs by removing the old plug and installing either a new Alloy 690 rolled or welded plug. Future outages will continue to eddy-current inspect all remaining Alloy 600 rolled plugs. The safety significance was that the crack indications were found on the non-pressure end of the plug roll joint. The indications were all axial and would not have resulted in plug failure. There was no impact on plant, personnel, or public safety.

- Foreign Material in OTSG-B (CR-3 NCR):
  Eddy current testing conducted during the Fall 2007 outage discovered an unidentified object in one of the OTSG-B tubes that prevented complete inspection of the tube. Efforts to dislodge the object failed. It was recommended to plug the tube instead of expending significant dose to identify and retrieve the object. Additional investigation determined that the object was a piece of fuel assembly grid strap. Corrective actions include the prevention of future occurrences of loose fuel assembly grid strap fragments. Since the remainder of the tube did not have any significant degradation and the object was captured within the tube, it was concluded that the tube could be removed from service by plugging, and that no additional actions were necessary. The tube was plugged by installing AREVA roll plugs made from Alloy 690 material.

  Causal factors were:
  - Fuel assembly damage/failure such that a fragment of the fuel grid strap had separated and was lost into the RCS. The fuel damage was caused either by fuel handling failure or baffle plate wear.

  Corrective actions were:
  - Refueling planning and fuel handling techniques have been refined and improved over the last several cycles to limit the potential interactions as the core is loaded. Also, the use of the improved cladding will result in less warpage and twist, leading to better loading characteristics. Baffle plate wear is a recently identified phenomenon that is the subject of a combined AREVA/Progress Energy root cause review. Corrective actions to prevent baffle plate wear damage will be derived through existing efforts. Eddy current testing of the unobstructed sections of the tube were conducted prior to plugging to ensure that a tube stabilizer was not required. No degradation other than some minor wear at the 6th tube support plate was found. Therefore, stabilization of the tube was found to not be necessary.

Inspections performed during CR-3 refueling outages indicate the following active degradation mechanisms in the current steam generators:

- Upper bundle axial outside diameter stress corrosion cracking/intergranular attack (ODSCC/IGA),
- Axial ODSCC/IGA in the upper tube sheet crevice,
- Axial and circumferential primary water stress corrosion cracking in roll expansion regions,
- General volumetric degradation,
- Wear at tube support locations,
- Volumetric degradation in the first span Alternate Repair Criteria region of OTSG-B, and
- Tube end cracks confined exclusively to the depth of the tubesheet clad.

The steam generators at CR-3 are scheduled to be replaced in 2009.

This OE review shows that the Steam Generator Tube Integrity Program is continually upgraded based on industry experience, external and internal assessments, and routine program performance, and has provided an effective means of ensuring steam generator tube integrity. The overall effectiveness of the Steam Generator Integrity Program is supported by the OE for systems, structures, and components; no tube integrity-related degradation has resulted in loss of component intended function.

Conclusion

Continued use of the Steam Generator Tube Integrity Program, as implemented by the Steam Generator Integrity Program will provide reasonable assurance that applicable aging effects are managed such that the steam generator components/commodities within the scope of License Renewal will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.10 OPEN-CYCLE COOLING WATER SYSTEM PROGRAM

Program Description

The CR-3 Open Cycle Cooling Water (OCCW) System Program relies on implementation of the recommendations in NRC Generic Letter 89-13, “Service Water System Problems Affecting Safety-Related Equipment,” and the guidance in its supplement, “Service Water Problems Affecting Safety-Related Equipment (Generic Letter 89-13, Supplement 1),” to ensure that the effects of aging associated with the Nuclear Services and Decay Heat Seawater System will be managed for the period of extended operation. The Program includes surveillance and control techniques to manage aging effects caused by biofouling, corrosion, erosion, and silting in the Nuclear Services and Decay Heat Seawater System or structures and components serviced by the System.

The OCCW System Program addresses the Nuclear Services and Decay Heat Seawater System, as well as the raw water side of the Decay Heat Closed Cycled Cooling and the Nuclear Service Closed Cycle Cooling System heat exchangers.

NUREG-1801 Consistency

The OCCW System Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.M20.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the below-listed enhancements will be implemented:

<u>Program Elements Affected</u>

- **Preventive Actions**
  1) The Nuclear Services and Decay Heat Seawater System Pumps will be included in a periodic inspection/rebuild program. This program will be initiated during the current license period and will inspect one or more pumps prior to the period of extended operation.

  2) The Nuclear Services and Decay Heat Seawater System Discharge Conduits will be subject to inspection / evaluation subsequent to the steam generator replacement project, but prior to the period of extended operation. The results

from this activity will determine the extent of activities required during the period of extended operation to support the intended function of these components.

3) Periodic maintenance activities will be established for Nuclear Services and Decay Heat Seawater expansion joints RWEJ-3, -4, -5, -6, -7, -8, -9, and -10.

Operating Experience

The seawater environment associated with the Nuclear Services and Decay Heat Seawater System is an aggressive environment. A review of plant OE identifies instances of degradation including:

- Macro-fouling in the Nuclear Services and Decay Heat Seawater and Decay Heat Closed Cycle Cooling heat exchangers by loose marine shells,
- Tube plugging activities in the Nuclear Services and Decay Heat Seawater heat exchangers,
- Degradation of protective lining in piping spools,
- Minor system leakage, and
- Cyclone separator and strainer fouling.

The CR-3 AMR methodology predicts aging effects consistent with plant OE. The OCCW System Program incorporates an extensive range of inspection and maintenance activities to ensure system intended functions are maintained.

Past inspections performed at CR-3 have revealed multiple instances of selective leaching in equipment in seawater applications. The discharge heads on the seawater pumps in the Nuclear Services and Decay Heat Seawater System have been replaced multiple times due to damage from decarbonization of the cast iron. Action Requests document a failure of an aluminum bronze check valve hinge pin stop due to "dealloying and environmentally assisted stress" in valve RWV-34. "Dealloying" of aluminum bronze cladding on seawater heat exchangers has also been identified. Typically the Selective Leaching of Materials Program would be specified to manage the aging effect of selective leaching, using a one-time inspection of a representative sampling of components. However, since selective leaching has already been identified as an existing aging mechanism in these applications, the Selective Leaching of Materials Program will not be specified, rather the aging effect will be managed by periodic inspections under the OCCW System Program.

Conclusion

The OCCW System Program has been effective at managing aging effects for safety related components wetted by raw water. The Program has been improved through evaluation of site and industry OE. Following enhancement, the continued use of the OCCW System Program will provide reasonable assurance that the aging effects will be managed such that the applicable components will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.11 CLOSED-CYCLE COOLING WATER SYSTEM PROGRAM

Program Description

The Closed-Cycle Cooling Water (CCCW) System Aging Management Program addresses aging management of components in or cooled by CR-3 CCCW Systems, including the Decay Heat Closed Cycle Cooling Water System, the Nuclear Services Closed Cycle Cooling Water System, the Secondary Services Closed Cycle Cooling Water System, and the Industrial Cooling System. The AMP scope also includes components in Control Complex Chilled Water and Appendix R Chilled Water Systems, the diesel engine Jacket Coolant System, and the Instrument Air System. These cooling systems are closed cooling loops with controlled chemistry, consistent with the NUREG-1801 description of a closed-cycle cooling water system. This Program relies on maintenance of system corrosion inhibitor concentrations within specified limits of the EPRI Closed Cooling Water Chemistry Guidelines to minimize corrosion. Surveillance testing and inspection in accordance with standards in the EPRI report for CCCW systems is performed to evaluate system and component performance. These measures will ensure that the CCCW systems and components serviced by the CCCW systems will continued to perform their intended functions acceptably.

NUREG-1801 Consistency

The CCCW System Program is an existing program consistent with NUREG-1801, Section XI.M21, with exceptions.

Exceptions to NUREG-1801

<u>Program Elements Affected</u>

- **Parameters Monitored/Inspected**
  1) The Secondary Services Closed Cycle Cooling Water System and Instrument Air System closed cooling pumps are not subject to a formal test program. However, the ability of these systems to maintain adequate flow rates and heat transfer is verified on an ongoing basis by routine operation of this system in support of the operating unit. Industrial Cooling System pumps are likewise not subject to a formal test program; however, this system is only in scope for spatial interaction, and pump flow rate is not relevant to the spatial interaction intended function.

  2) The Secondary Services Closed Cycle Cooling Water System and Instrument Air System heat exchangers are not subject to a formal performance monitoring program. However, acceptable thermal/hydraulic performance of these systems is verified on an ongoing basis by operation of the systems in support of unit operations. Likewise, Industrial Cooling System heat exchangers are not subject

to a formal test program, however, this system is in scope only for spatial interaction and heat transfer is not relevant to the intended function.

Enhancements

None.

Operating Experience

Plant-specific OE review associated with components cooled by CCCW noted a number of events associated with fouling and corrosion of the Nuclear Services Closed Cycle Cooling Water Heat Exchangers. These include fouling of tubes, tube leakage, and dealloying of the aluminum bronze cladding on the tubesheets. These deficiencies were associated with the tube side of the heat exchangers exposed to seawater. The associated aging effects credit the Open Cycle Cooling Water System Program for aging management including management of selective leaching of the Nuclear Services Closed Cycle Cooling Water Heat Exchanger tubesheet cladding.

Other items were noted associated with isolated events, including instances of leakage and low flow. A conductivity excursion was also noted in the closed cycle cooling water portion of the Industrial Cooling System. These events do not involve corrosion related to CCCW environments, or provide indication of generic weaknesses in the CCCW System Program. The Program is continually upgraded based on industry experience, external and internal assessments, and routine program performance, and has provided an effective means of mitigating loss of material, cracking, and reduction of heat transfer effectiveness.

Conclusion

Continued implementation of the CR-3 CCCW System Program provides reasonable assurance that the aging effects will be managed so that the systems and components within the scope of this Program will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.12 INSPECTION OF OVERHEAD HEAVY LOAD AND LIGHT LOAD HANDLING SYSTEMS PROGRAM

Program Description

The Inspection of Overhead Heavy Load and Light Load Handling Systems Program provides for inspection of the following cranes:

Structure	Crane(s)
Reactor Building	RB Polar Crane Reactor Vessel Tool Handling Jib Crane 5-Ton Jib Crane CRDM Jib Crane Main Fuel Handling Bridge Crane
Auxiliary Building	120-Ton Fuel Handling Area Crane Spent Fuel Pit Missile Shield Crane Spent Fuel Pool Handling Bridge Crane
EFW Pump Building	EFW Pump Building 3-Ton Crane
Circulating Water Intake Structure	Intake Gantry Crane

The inspections monitor structural members for the absence of signs of corrosion, other than minor surface corrosion, and crane rails for abnormal wear. The inspections are performed every refuel cycle for cranes inside the Reactor Building. Cranes outside the Reactor Building are inspected every two years.

NUREG-1801 Consistency

The Inspection of Overhead Heavy Load and Light Load Handling Systems Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.M23.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the below-listed enhancements will be implemented:

Program Elements Affected

- **Scope of Program**
  Revise administrative controls to include all cranes that are within the scope of License Renewal.

- **Parameters Monitored/Inspected**
  1) Revise administrative controls to require notifying the responsible engineer of unsatisfactory inspection results involving loss of material, including loss of material owing to wear of rails, for cranes in scope of License Renewal.

  2) Revise administrative controls to include all cranes that are within the scope of License Renewal.

- **Detection of Aging Effects**
  1) Revise administrative controls to clarify that crane rails are to be inspected for abnormal wear, and that members to be inspected for cracking include welds, and

  2) Revise administrative controls to specify frequency of inspections for in-scope cranes to be every refueling outage for cranes inside the RB and every two years for cranes outside the RB.

Operating Experience

Based on a review of plant history, CR-3 has performed periodic inspections of cranes, has utilized assessments to identify programmatic deficiencies and improvements, and has tracked the resolutions by means of the Corrective Action Program. A review of crane inspections and assessments identified no evidence of corrosion of structural members or wear of rails. Nevertheless, the aging effect of corrosion has been found for other carbon steel components for similar environments; and, therefore, monitoring for these aging effects is appropriate. Crane monitoring programs are continually being upgraded based upon industry and Progress Energy plant experience. In addition, self-assessments are periodically scheduled at CR-3 and on other Progress Energy nuclear plants. A self-assessment was performed in 2006 to review Control of Heavy Loads for all Progress Energy plants. For CR-3, it was determined that there was no dedicated rigging engineer. Another assessment was performed in 2008, and assessment findings are being addressed. In July 2008, a system engineer for cranes was assigned at CR-3. In addition, a qualified structural engineer will perform any specific structural inspections. The results of this proactive approach to the operation and management of cranes validate the effectiveness of the procedures that implement the Inspection of Overhead Heavy Load and Light Load Handling Systems Program. Based on these results, OE provides evidence that the Program activities will continue to ensure the integrity of the cranes within the scope of License Renewal.

Conclusion

The Inspection of Overhead Heavy Load and Light Load Handling Systems Program, with the enhancements identified above, will provide reasonable assurance that the aging effects of corrosion of structural components and crane rail wear are adequately managed so that the intended functions of cranes within the scope of License Renewal are maintained during the period of extended operation.

B.2.13 FIRE PROTECTION PROGRAM

Program Description

The CR-3 Fire Protection Program provides aging management of the fire protection components including penetration seals; expansion joints; fire barrier walls, ceilings, and floors; fire rated doors; Diesel Fire Service Pump fuel oil supply lines; fire barrier assemblies such as fire wraps on trays, pipes, and conduits; and the Halon system used for the Control Complex cable spreading room. The Program is implemented through various plant procedures and will effectively manage the aging effects associated with the subject components such that the intended functions of applicable components will be maintained through the period of extended operation.

NUREG-1801 Consistency

The CR-3 Fire Protection Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.M26, with exceptions.

Exceptions to NUREG-1801

<u>Program Elements Affected</u>

- **Parameters Monitored/Inspected**
  NUREG-1801 recommends periodic visual inspection and function testing of Halon suppression systems be performed at least once every six months. The CR-3 Fire Protection Program performs only functional testing of the Halon system once per 18 months. Although the functional testing frequency exceeds the recommended frequency, it is sufficient to ensure the Halon system will perform its intended function. The exception is acceptable based on the Halon system being located within the cable spreading room, a conditioned air environment within the CR-3 control complex. As noted in NUREG-1801, corrosion of external surfaces is not expected in controlled air environments.

- **Detection of Aging Effects**
  1) The exception discussed under Parameters Monitored/Inspected above also affects the Detection of Aging Effects program element.

  2) NUREG-1801 recommends visual inspection of walls, ceilings, and floors be performed at least once every refueling outage. The CR-3 Fire Protection Program performs visual inspection of walls, ceilings, and floors on a frequency commensurate with the safety significance of the structure and its condition but not to exceed 10 years. The exception is acceptable based on using an existing procedure for structural inspections and that CR-3 OE has not detected degradation of fire barrier walls, ceilings, and floors which has resulted in a loss

of fire barrier function. The structural inspections are sufficient to detect gradual degradation of the fire barrier walls, ceilings, and floors. The frequency of inspections would be increased depending on the as-found condition.

- **Monitoring and Trending**
  The exception for the visual inspection of walls, ceilings, and floors discussed under Detection of Aging Effects above also affects the Monitoring and Trending program element.

Enhancements

Prior to the period of extended operation, the below-listed enhancements will be implemented:

Program Elements Affected

- **Scope of Program**
  The CR-3 Fire Protection Program will be enhanced to include a procedure for periodic inspections of fire barrier walls, ceilings, and floors.

- **Parameters Monitored/Inspected**
  1) The Fire Protection Program procedure for periodic inspections of penetrations seals will be enhanced to include inspections for seal separation from walls and components, separation of layers of material, rupture and puncture of seals which are directly caused by increased hardness, and shrinkage of seal material due to weathering.

  2) The CR-3 Fire Protection Program procedure for the annual inspection of fire doors will be enhanced to include visual inspection for loss of material (corrosion) with an acceptance criterion of absence of signs of corrosion other than minor surface corrosion.

- **Detection of Aging Effects**
  The Fire Protection Program administrative controls for periodic inspections of penetrations seals and fire doors will be enhanced to specify a minimum qualification requirement for personnel performing visual inspections.

- **Monitoring and Trending**
  The program enhancements described above under the Parameters Monitored/Inspected program element are necessary for consistency with this NUREG-1801 program element.

- **Acceptance Criteria**
  The CR-3 Fire Protection Program procedures for periodic inspections of concrete fire barrier walls, ceilings, and floors will be enhanced to add a step to

notify Fire Protection of any deficiencies having the potential to adversely affect the fire barrier function of concrete walls, ceilings, and floors.

Operating Experience

The Fire Protection Program is maintained in accordance with CR-3 engineering program requirements and managed in accordance with plant administrative controls. The operating history and assessment results for the Program show it is an effective means of ensuring the preservation from fire of the safe shutdown capability of CR-3. The CR-3 Fire Protection Program is continually improving based on both industry and plant-specific OE. Industry OE is incorporated into the Fire Protection Program via the Operating Experience Program and as a result of NRC generic communications. The CR-3 Program benefits from benchmarking other Progress Energy plants as well as other industry plants. Plant-specific OE is also used to improve the Fire Protection Program through use of the Corrective Action Program and program assessments. The Corrective Action Program is being used to identify adverse conditions, track corrective actions, and improve the Fire Protection Program.

The Fire Protection Program requires a Triennial Inspection performed by NRC personnel and biennial self-assessments. The Triennial Inspection includes reviews of the CR-3 Corrective Action Program and the Operating Experience Program.

Conclusion

Following program enhancement, implementation of the CR-3 Fire Protection Program will ensure the effects of aging associated with the fire protection related components will be adequately managed such that there is reasonable assurance that their intended functions will be performed consistent with the CLB through the period of extended operation.

B.2.14 FIRE WATER SYSTEM PROGRAM

Program Description

The Fire Water System Program includes system pressure monitoring, wall thickness evaluations, periodic flow and pressure testing in accordance with applicable National Fire Protection Association (NFPA) commitments and periodic visual inspection of overall system condition. These activities provide an effective means to determine whether corrosion and biofouling are occurring. Inspections of sprinkler heads assure that corrosion products that could block flow of the sprinkler heads are not accumulating. These measures will allow timely corrective action in the event of system degradation to ensure the capability of the water-based Fire Suppression System to perform its intended function.

NUREG-1801 Consistency

The Fire Water System Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.M27.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the below-listed enhancements will be implemented:

<u>Program Elements Affected</u>

- **Parameters Monitored/Inspected**
  Revise the Program documents to incorporate a requirement to perform one or a combination of the following two activities:

  a) Implement periodic flow testing consistent with the intent of NFPA 25.

  b) Perform wall thickness evaluations to verify piping is not impaired by pipe scale, corrosion products, or other foreign maternal. For sprinkler systems, this may be done by flushing, internal inspection by removing one or more sprinkler heads, or by other obstruction investigation methods, such as, technically proven ultrasonic and X-ray examination, that have been evaluated as being capable of detecting obstructions.

These inspections will be performed before the end of the current operating term. The results from the initial inspections will be used to determine inspection intervals thereafter during the period of extended operation.

- **Detection of Aging Effects**
  1) Revise the Program documents to incorporate a requirement to perform internal inspections of system piping at representative locations as required to verify that loss of material due to corrosion has not impaired system intended function. Alternately, non-intrusive inspections (eg., UT exams) can be used to verify piping integrity. These inspections will be performed before the end of the current operating term. The results from the initial inspections will be used to determine inspection intervals thereafter during the period of extended operation.

  2) Enhance the Program to perform a visual inspection of yard fire hydrants annually consistent with the intent of NFPA 25 to ensure timely detection of signs of degradation, such as corrosion.

  3) Enhance the Program, consistent with the intent of NFPA 25, to either replace the sprinkler heads prior to reaching their 50-year service life or perform field service testing of representative samples from one or more sample areas by a recognized testing laboratory. Subsequent test intervals will be based on test results.

Operating Experience

CR-3 OE includes considerable maintenance associated with the Fire Water Storage Tanks. Problems noted with these tanks include corrosion of tank vents and platforms, corrosion of weld heat affected zones, undercutting and arc strikes from original construction, and coating deficiencies inside and out. To address these issues, both tanks have been reconditioned, including replacing degraded vents and appurtenances, draining, cleaning and repairing internal surfaces, and applying protective coatings inside and out. Preventive maintenance activities have been implemented for annual inspections of the tanks exterior, and inspections of the internal surfaces on a five year frequency.

The CR-3 Fire Protection Program, which includes the Fire Water System Program activities described herein, is maintained in accordance with the Corporate QA Program, and subject to regular reviews and assessment. A review of the last three triennial self-assessment inspection reports confirms that assessments are being done, and that the program is subject to continual review and improvement. Specific results from the last triennial review report identify weaknesses in specifying compensatory actions, allocating fire protection resources for outage demands and site initiatives, errors in Fire Protection administrative documents, and documenting program improvement opportunities identified through benchmarking. Corrective actions for these items are being addressed and tracked to resolution in the Corrective Action

Program. The report concluded that the CR-3 Fire Protection Functional Area is effectively executing and fulfilling its requirements.

Conclusion

Continued implementation of the CR-3 Fire Water System Program, including the enhancements identified above, will assure that the components/commodities associated with the water-based Fire Suppression System will perform their intended functions for the period of extended operation.

B.2.15 ABOVEGROUND STEEL TANKS PROGRAM

Program Description

The Aboveground Steel Tanks Program manages aging effects of loss of material for external surfaces and inaccessible locations of the Fire Service Water Storage Tanks and the Condensate Storage Tank. These tanks are constructed of carbon steel. This Program relies on periodic system walkdowns and planned preventive maintenance inspections to monitor the condition of these tanks. This Program includes an assessment of the condition of 1) tank surfaces protected by a coating, although the paint is not credited to perform a preventive function, and 2) the sealing of the concrete foundation. For inaccessible surfaces, such as the tank bottom, thickness measurements will be performed from inside the tank to assess the tank bottom condition. Performing these inspections of tank bottoms ensures that degradation or significant loss of material will not occur in inaccessible locations. The frequency of tank bottom volumetric inspections will be based on the findings of inspections performed prior to the period of extended operation.

NUREG-1801 Consistency

The Aboveground Steel Tanks Program is a new program consistent with NUREG-1801, Section XI.M29.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The Aboveground Steel Tanks Program is a new program, and as such no OE exists for a demonstration of program effectiveness. Currently, periodic inspections are performed to determine the material condition of the applicable tanks. Holes were discovered in the Condensate Storage Tank bottom. After the holes were repaired, an acceptable nondestructive examination and visual inspection were performed. The Fire Service Water Storage Tanks have had concerns about their external condition. These included broken grout around the tank perimeter, chalking of paint, and corrosion of the roof vent.

Conclusion

Implementation of the Aboveground Steel Tanks Program will assure the effects of aging associated with the tanks will be adequately managed so that there is reasonable assurance that their intended functions will be maintained consistent with the CLB during the period of extended operation.

B.2.16 FUEL OIL CHEMISTRY PROGRAM

Program Description

Fuel oil quality is maintained by the purchase of quality fuel and establishment of a diesel fuel oil testing program to implement required testing of both new and stored fuel oil. The existing Fuel Oil Chemistry Program includes sampling and testing requirements and acceptance criteria in accordance with applicable American Society for Testing Materials (ASTM) Standards identified in CR-3 Technical Specification surveillance requirements and chemistry program procedures for fuel oil testing. Exposure to fuel oil contaminants, such as water and microbiological organisms, is minimized by verifying the quality of new fuel oil and the addition of a biocide, a stabilizer, and corrosion inhibitors. Subsequently, periodic sampling is performed to verify that the tanks are free of water, particulates, and biological growth. The effectiveness of the Program is verified by periodic tank inspections to ensure that significant degradation is not occurring so that the component intended function will be maintained during the extended period of operation.

The tanks within the scope of License Renewal and addressed by the Program are the Emergency Diesel Fuel Oil Storage Tanks, the Emergency Diesel Fuel Oil Day Tanks, the Diesel-Driven Fire Pump Fuel Oil Storage Tanks, and the Diesel-Driven Emergency Feedwater Pump Fuel Oil Storage Tank.

NUREG-1801 Consistency

The Fuel Oil Chemistry Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.M30, with exceptions.

Exceptions to NUREG-1801

<u>Program Elements Affected</u>

- **Scope of Program**
  1) CR-3 uses ASTM Standard D2709, not ASTM D1796. Both of these standards are tests for water and sediment. The Progress Energy Corporate specification for fuel oil indicates that the acceptance criteria for both of these standards are the same. Based upon the similarities of tested property and acceptance criteria, this exception to NUREG-1801 is justified.

  2) CR-3 uses ASTM D2276, not ASTM D6217. Both ASTM D2276 and ASTM D6217 are tests for particulate contamination. Based upon the similarities of tested property (particulates), this exception to NUREG-1801 is justified. In addition, ASTM Standard 2276 is set forth in the CR-3 Technical Specifications as the required standard for determining particulate contamination.

- **Preventive Actions**
  1) Water is not periodically drained from the bottom of Diesel-Driven Emergency Feedwater Pump Fuel Oil Storage Tank. However, this tank is recirculated during quarterly sampling through a filter-separator water coalescer designed to remove entrained fluids such as water. Based on entrained fluids such as water being removed quarterly by the filter-separator, this exception to NUREG-1801 is justified.

  2) The Diesel-Driven Fire Pump Fuel Oil Storage Tanks are not periodically drained of water. Sampling of the tanks to determine water buildup in the tank bottom is performed quarterly. If water exceeding the limit is found, actions are taken either to remove the water or replace the fuel. Based on quarterly sampling for water buildup, this exception to NUREG-1801 is justified.

- **Parameters Monitored/Inspected**
  1) CR-3 uses the guidance in ASTM D 2276-91 for determination of particulates. The filter used is a smaller pore size than that in the ASTM Standard recommended in NUREG-1801. Since a filter with a smaller pore size traps more particulates than one with a larger pore size, this test provides more conservative results than the one recommended by NUREG-1801. Therefore, this exception to NUREG-1801 is justified.

  2) CR-3 uses ASTM Standard D2709, not ASTM D1796. Both of these standards are tests for water and sediment. The Progress Energy Corporate specification for fuel oil indicates that the acceptance criteria for both of these standards are the same. Based upon the similarities of tested property and acceptance criteria, this exception to NUREG-1801 is justified.

- **Detection of Aging Effects**
  1) Multi-level sampling is not performed on the Diesel-Driven Emergency Feedwater Pump Fuel Oil Storage Tank and the Diesel-Driven Fire Pump Fuel Oil Storage Tanks. Multi-level sampling is performed for larger fuel oil tanks. Prior to sampling the Diesel-Driven Emergency Feedwater Pump Fuel Oil Storage Tank, a two-volume recirculation of the tank is verified. This provides for sampling of mixed contents. In addition, multi-level sampling is performed on the Emergency Diesel Fuel Oil Storage Tanks, which can be the source of fuel oil for Diesel-Driven Fire Pump Fuel Oil Storage Tanks. Prior to sampling the Diesel-Driven Fire Pump Fuel Oil Storage Tanks, discharge piping flow is established to provide a mixed sample. Based on the above factors, the exception to NUREG-1801 multi-level sampling is justified.

  2) Routine sampling is not performed on the Emergency Diesel Fuel Oil Day Tanks. Day tank fuel volumes are cycled and refreshed each month during the Emergency Diesel surveillance runs. Prior to these surveillance runs, fuel oil

from the bottom of the day tanks is removed and returned to the Emergency Diesel Fuel Oil Storage Tanks. Based upon the above, this exception to NUREG-1801 is justified.

3) Ultrasonic testing (UT) measurements of tank wall thickness would only be performed on in-scope tanks if visual inspection reveals significant internal damage due to loss of material. This exception is justified because if visible damage on the internal surface is not identified, then there is no compelling reason to perform UT measurements. Prior to the period of extended operation, all of the subject tanks will have had a periodic inspection of their internal surfaces. With the exception of the Emergency Diesel Fuel Oil Storage Tanks, these are above ground tanks located inside protected structures; and their external surfaces will be monitored during the period of extended operation in accordance with the License Renewal External Surfaces Monitoring Program. For the in-scope tanks, if there is no significant corrosion identified in internal and external inspections, then additional UT inspections are not warranted. Based on the above, this exception is justified.

- **Acceptance Criteria**
  1) CR-3 uses the guidance in ASTM D 2276-91 for determination of particulates. The filter used is a smaller pore size than that in the ASTM Standard recommended in NUREG-1801. Since a filter with a smaller pore size traps more particulates than one with a larger pore size, this test provides more conservative results than the one recommended by NUREG-1801. Therefore, this exception to NUREG-1801 is justified.

  2) CR-3 uses ASTM Standard D2709, not ASTM D1796. Both of these standards are tests for water and sediment. The Progress Energy Corporate specification for fuel oil indicates that the acceptance criteria for both of these standards are the same. Based upon the similarities of tested property and acceptance criteria, this exception to NUREG-1801 is justified.

Enhancements

Prior to the period of extended operation, the below-listed enhancements will be implemented:

<u>Program Elements Affected</u>

- **Preventive Actions**
  1) Adjust the inspection frequency for the Diesel-Driven Emergency Feedwater Pump Fuel Oil Storage Tank to ensure an inspection is performed prior to the period of extended operation.

  2) Inspect the internal surfaces of the Diesel-Driven Fire Pump Fuel Oil Storage

Tanks and develop a work activity to periodically inspect the internal surfaces of these tanks. Prior to the inspection, remove fuel, water, and sediment as much as practical due to limited access. UT or other non-destructive examination (NDE) will be performed if visual inspection proves inadequate or indeterminate.

- **Detection of Aging Effects**
  1) Adjust the inspection frequency for the Diesel-Driven Emergency Feedwater Pump Fuel Oil Storage Tank to ensure an inspection is performed prior to the period of extended operation.

  2) Inspect the internal surfaces of the Diesel-Driven Fire Pump Fuel Oil Storage Tanks and develop a work activity to periodically inspect the internal surfaces of these tanks. Prior to the inspection, remove fuel, water, and sediment as much as practical due to limited access. UT or other NDE will be performed if visual inspection proves inadequate or indeterminate.

Operating Experience

The Fuel Oil Chemistry Program is implemented and maintained in accordance with the general requirements for chemistry programs. This provides assurance that the Program is effectively implemented to meet regulatory, process, and procedure requirements. Qualified personnel are assigned as program managers and are given authority and responsibility to implement the Program. In addition, adequate resources are committed to Program activities. Specific examples of OE include:

- Diesel fuel oil particulates are increasing. The problem was related to the mixing of diesel fuels and the lack of a fuel stabilizer. In November 2007, while in a refueling outage, the Emergency Diesel Generator Fuel Oil Storage Tanks were off-loaded and the fuel was filtered through a very fine clay media filtration process. The particulates for both tanks were reduced significantly to about 1mg/L or less. While this cleaned the fuel, it was noted this would not prevent the recurrence of particulate formation without the use of a fuel stabilizer.

  Southwest Research Institute (SWRI) was contracted to help resolve the diesel fuel particulate issue; this same organization provided testing and recommendations in 2007 to help resolve the fuel particulate issues that were occurring at that time. SWRI previously recommended CR-3 no longer accept high sulfur diesel fuel for use onsite, clay filter the fuel during the refueling outage, and use a fuel stabilizer. The investigation is ongoing, with CR-3 currently using a fuel stabilizer

- The Diesel Driven Fire Pump Fuel Oil Storage Tanks have an increasing trend on particulates. The particulate levels are at 6.93 mg/l, just below the administrative limit of 7.0. The action was to replace the fuel oil in the tanks.

A review of plant condition reports and OE demonstrates that the Fuel Oil Chemistry Program at CR-3 is critically monitored, and continually improving. Based on these results, the OE review provides evidence that the Fuel Oil Chemistry Program practices have thus far ensured the integrity of the subject components wetted by fuel oil.

Conclusion

With the addition of the proposed enhancements, the Fuel Oil Chemistry Program will provide reasonable assurance that aging effects will be managed such that the applicable components will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.17 REACTOR VESSEL SURVEILLANCE PROGRAM

Program Description

The Reactor Vessel Surveillance Program manages the reduction of fracture toughness of the reactor vessel beltline materials due to neutron embrittlement. As part of the Reactor Vessel Surveillance Program, CR-3 participates in the Master Integrated Reactor Vessel Surveillance Program (MIRVP) and monitors fluence using periodic fluence projections and alternative dosimetry, consistent with the intent and scope of 10 CFR 50, Appendix H. The Reactor Vessel Surveillance Program evaluates the effect of neutron embrittlement by projecting upper-shelf energy (USE) and pressurized thermal shock (PTS) reference temperatures for all reactor materials with projected neutron exposure greater than 10^{17} n/cm^2 (E > 1.0 MeV) after 60 years of operation and with the development of pressure-temperature limit curves. Embrittlement information is obtained in accordance with NRC Regulatory Guide 1.99, Revision 2, chemistry tables and with surveillance capsules, which have provided credible data for the current operating period and for the period of extended operation. The surveillance program design, capsule withdrawal schedule, and evaluation of test results are in accordance with ASTM E 185-82. Select tested specimens are stored for future use, if needed. The Reactor Vessel Surveillance Program controls the remaining capsules so that withdrawal of the remaining capsules is managed through the MIRVP and has been approved by the NRC. The Reactor Vessel Surveillance Program manages the steps taken if reactor vessel exposure conditions are altered, such as, the review and updating of 60-year fluence projections to support the preparation of new pressure-temperature limit curves and pressurized thermal shock reference temperature calculations.

NUREG-1801 Consistency

The CR-3 Reactor Vessel Surveillance Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.M31, with exception.

Exceptions to NUREG-1801

Program Elements Affected

- **Program Element 4**
  NUREG-1801 Program Element 4 states that pulled and tested capsules, unless discarded before August 31, 2000, are placed in storage and that these specimens are saved for future reconstitution use in case the surveillance program is reestablished. Some MIRVP tested specimens have been disposed instead of being retained for future reconstitution use. However, sets of specimens from beltline weld heats at CR-3 are permanently archived at Point Beach Nuclear Plant. Program Element 4 states that the specimens from beltline

weld heats in CR-3 are being permanently saved for future use; the CR-3 Reactor Vessel Surveillance Program meets the intent of the program element.

Enhancements

Prior to the period of extended operation, the below-listed enhancements will be implemented:

Program Elements Affected

- **Program Element 1**
  Enhance the Program to ensure that neutron exposure conditions of the reactor vessel remain bounded by those used to project the effects of embrittlement to the end of the 60-year extended license period.

- **Program Element 4**
  Establish formalized controls for the storage of archived specimens to ensure availability for future use by maintaining the identity, traceability, and recovery of the archived specimens throughout the period of storage.

- **Program Element 6**
  Refer to the enhancement for projecting the effects of embrittlement discussed under Program Element 1 above.

- **Program Element 7**
  Refer to the enhancement for projecting the effects of embrittlement discussed under Program Element 1 above.

- **Program Element 8**
  Refer to the enhancement for projecting the effects of embrittlement discussed under Program Element 1 above.

Operating Experience

The Reactor Vessel Surveillance Program is described in FSAR Section 4.4.5 and has provided materials data and dosimetry for the monitoring of irradiation embrittlement since plant startup. CR-3 participates in the MIRVP and monitors reactor vessel fluence using periodic fluence updates and alternative dosimetry.

Surveillance capsules have been withdrawn during the period of current operation, and the credible data from these surveillance capsules have been used to verify and predict the performance of CR-3 reactor vessel beltline materials with respect to neutron embrittlement. Calculations have been performed as required to project the degree of reduction in USE and PTS reference temperature that is expected to result from projected neutron exposure in the future, including 60-year projections.

Pressure/temperature limits have been imposed on operational parameters at CR-3 to assure that the vessel is operated within required safety margins. Even though the capsules remaining inside the CR-3 reactor vessel are not expected to provide meaningful data for CR-3, meaningful data from five capsules containing the CR-3 limiting weld materials have already been pulled and tested thereby completing the requirement for capsule withdrawals in accordance with ASME E 185-82 for 60 years for CR-3. Some of these limiting weld materials were exposed to fluences approximately equal to the 54 EFPY CR-3 reactor vessel projected peak fluence.

A review of NRC Information Notices, Bulletins, and Generic Letters, NRC Agencywide Document Access Management System (ADAMS), INPO OE database, and other relevant sources were performed for applicable OE. The following items were identified:

- The MIRVP was developed as a response to the failure of surveillance capsule holder tubes in several B&W-supplied reactor vessels and the necessity to obtain fracture toughness data for irradiated weld metals to ensure continued licenseability. For these plants, which include CR-3, the original Reactor Vessel Surveillance Programs could not provide sufficient material data and dosimetry to monitor embrittlement. The MIRVP approach is effective because it satisfies the requirements of 10 CFR 50, Appendix H, which states that an integrated surveillance program the participating plants must have similar design and operating features, an adequate dosimetry program, and an adequate arrangement for data sharing between plants. The MIRVP provides sufficient material data to meet the ASTM E-185-82 capsule program requirements for monitoring embrittlement. The NRC staff evaluated the basis for the integrated program concept, determined the MIRVP to be acceptable, and approved BAW-1543, Revision 3, by letter dated June 11, 1991. This letter concluded that the program met the applicable criteria from 10 CFR 50, Appendix H. BAW-1543, Revision 4 and its supplements have been frequently issued to incorporate program improvements, such as updated capsule withdrawal schedules, revised capsule status, and updated fluence projections.

- BAW-1543, Revision 4, Supplement 5 was issued because BAW-1543, Revision 4, Supplement 4 included a commitment regarding the removal of capsules OC1-D and OC3-F; however, that commitment could not be met because these capsules could not be removed from the CR-3 reactor vessel. By letter dated May 16, 2005, the NRC staff reviewed and approved the revised withdrawal schedule, stating that there was no impact in fulfilling the requirements of 10 CFR 50 Appendix H or ASTM E 185-82, because there were additional capsules within the MIRVP that contained the same limiting material.

The OE review showed that the CR-3 Reactor Vessel Surveillance Program is continually improving, provides for the continued safe operation of the plant by managing the reduction of fracture toughness of the reactor vessel beltline materials due to neutron embrittlement, and fulfills the intent and scope of 10 CFR 50, Appendix H.

Conclusion

The continued implementation of the Reactor Vessel Surveillance Program, with the enhancements identified above, will provide reasonable assurance that neutron embrittlement aging effects will be managed so that the systems and components within the scope of this Program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.18 ONE-TIME INSPECTION PROGRAM

Program Description

The One-Time Inspection Program uses one-time inspections to verify the effectiveness of an aging management program and confirm the absence of an aging effect. The Program includes verification inspections specified by NUREG-1801 for the Water Chemistry Program, Fuel Oil Chemistry Program, and Lubricating Oil Analysis Program, and plant-specific inspections to confirm the condition of certain civil/structural components. Prior to the period of extended operation, procedural controls for the Program will be implemented to track, initiate, complete, and report activities associated with one-time Inspections.

The One-Time Inspection Program is credited for aging management of various structures/components at CR-3 as shown below:

Structure/Component	Building Structure/ System	Aging Effect of Concern
Heat exchanger components and tubes, tanks, pump casings, closure heads, strainers, deaerators, heaters, orifices, flow elements, piping, venturis, flanges, covers, nozzles, turbine casings, steam generator components, piping components and elements that credit the Water Chemistry Program for aging management.	Auxiliary Steam Liquid Sampling Condensate OTSG Chemical Cleaning Control Complex Chilled Water Condensate Demineralizer Decay Heat Removal Demineralized Water Emergency Feedwater Main Feedwater Gland Steam Gland Seal Water Miscellaneous Drains Main Steam Make Up & Purification Reactor Coolant Station Drains Secondary Plant Cycle Startup Nuclear Services Closed Cycle Cooling Waste Disposal Radioactive Gas Waste Disposal Waste Gas Sampling	Cracking, Flow Blockage, Loss of Material, and Reduction of Heat Transfer

Structure/Component	Building Structure/ System	Aging Effect of Concern
Flow restrictors, Class 1 piping, fittings and branch connections, valve bodies, the RV Flange Leak Detection Line tap weld, and piping that credit the Water Chemistry and ASME Section XI In-service Inspection Programs for aging management.	Reactor Coolant Incore Monitoring	Cracking
Heat exchanger components and tubes, pump casings, heater housings, tanks, pans, strainers, expansion joints, and piping, piping components, and piping elements that credit the Lubricating Oil Analysis Program for aging management.	Control Complex Chilled Water Decay Heat Closed Cycle Cooling Jacket Coolant Diesel Generator Lube Oil Emergency Feedwater Main Feedwater Main Feedwater Turbine Lube Oil Reactor Coolant Pump Lube Oil Collection Make Up & Purification Reactor Coolant Secondary Services Closed Cycle Cooling Water Nuclear Services Closed Cycle Cooling	Cracking, Flow Blockage, Loss of Material, and Reduction of Heat Transfer
Tanks, filter housings, pump casings, strainers, standpipes, hydrants, piping, piping elements, and piping components that credit the Fuel Oil Chemistry Program for aging management.	Fuel Oil Fire Protection	Flow Blockage, Loss of Material, and Cracking
Emergency Diesel Fuel Oil Storage Tank hold-down Straps	Miscellaneous Structures	Loss of Material

NUREG-1801 Consistency

The One-Time Inspection Program is a new Program that is consistent with NUREG-1801, Section XI.M32.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The One-Time Inspection Program is a new program. The CR-3 aging management review process ensures that one-time inspections will be prescribed and developed with consideration of plant and industry OE, that results of the inspections performed under the Program are disseminated and evaluated, and that industry OE is reviewed for applicability.

NUREG-1801 is based on industry OE through January 2005. This Program applies to potential aging effects for which there are currently no OE indicating the need for an aging management program. Nevertheless, the elements that comprise these inspections (e.g., the scope of the inspections and inspection techniques) are consistent with industry practice. More recent OE is captured through the normal OE review process where it is screened for applicability. This process will continue through the period of extended operation.

Conclusion

Implementation of the One-Time Inspection Program provides reasonable assurance that aging effects will be managed so that the systems and components within the scope of this Program will continue to perform their intended functions consistent through the period of extended operation.

B.2.19 SELECTIVE LEACHING OF MATERIALS PROGRAM

Program Description

The Selective Leaching of Materials Program ensures the integrity of components and/or commodities (such as piping, pump casings, valve bodies and heat exchanger components) made of uninhibited copper alloys with zinc content greater than 15% or aluminum content greater than 8%, and gray cast iron exposed to a raw water, treated water, closed cycle cooling water, open cycle cooling water, fire water, steam, fuel oil, uncontrolled indoor air, or soil environment at CR-3. A new inspection procedure will define a one-time examination methodology and acceptance criteria. The Program will be implemented by the Work Management Process using a qualitative determination of selected components that may be susceptible to selective leaching. Confirmation of selective leaching may be performed with a metallurgical evaluation or other testing methods.

The examinations will determine whether loss of material due to selective leaching is occurring, and whether the process will affect the ability of the components to perform their intended function(s) for the period of extended operation. A sample population will be selected for the inspections which will be completed prior to commencing the period of extended operation. Evidence suggesting the presence of selective leaching will result in expanded sampling, as appropriate, and engineering evaluation.

NUREG-1801 Consistency

The Selective Leaching of Materials Program is a new program consistent with NUREG-1801, Section XI.M33, with an exception.

Exceptions to NUREG-1801

<u>Program Elements Affected</u>

- **Scope of Program**
  The exception involves the use of examinations, other than Brinell hardness testing identified in NUREG-1801, to identify the presence of selective leaching. A qualitative determination of selective leaching will be used in lieu of Brinell hardness testing for components within the scope of this Program. The exception is justified, because (1) Brinell hardness testing may not be feasible for most components due to form and configuration (e.g., heat exchanger tubes) and (2) other mechanical means, i.e., scraping, or chipping, provide an equally valid method of identification.

- **Parameters Monitored/Inspected**
  A qualitative determination of selective leaching will be used in lieu of Brinell

hardness testing for components within the scope of this Program. Refer to the discussion of this exception under the Scope of Program element above.

- **Detection of Aging Effects**
  A qualitative determination of selective leaching will be used in lieu of Brinell hardness testing for components within the scope of this Program. Refer to the discussion of this exception under the Scope of Program element above.

Enhancements

None.

Operating Experience

The Selective Leaching of Materials Program is a new program; therefore, OE to verify the effectiveness of the Program is not available. Past inspections performed at CR-3 have revealed instances of selective leaching of materials. The actions specified by the Corrective Action Program will ensure that appropriate measures will be taken to preclude or monitor for recurrence in systems or material/environment combinations in which selective leaching is detected. The Operating Experience Program ensures that other systems with similar material/environment combinations will also be inspected for selective leaching. Examples of plant-specific OE include the following items:

- Maintenance activities performed on cast iron Nuclear Service and Decay Heat Sea Water Pump 3B indicated that the discharge pump flange was degraded due to selective leaching. Corrosion products were removed mechanically and the area coated to inhibit further dealloying. No other actions were determined to be warranted since selective leaching is a slow process that is being inhibited by the coating. During a subsequent outage the degraded components were replaced.

- Investigation of a loose part in the Decay Heat Closed-Cycle Heat Exchanger B identified a bronze loose part. The loose part was found to originate from a hinge arm from valve RWV-34. The valve was found to be operational. Laboratory analysis showed that selective leaching was a principal contributor to the degradation of the valve component. Corrective actions included changing the hinge material to an aluminum bronze that is resistant to selective leaching and periodic inspections.

Conclusion

Implementation of the Selective Leaching of Materials Program will provide reasonable assurance that the aging effects will be managed such that the components within the scope of License Renewal will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.20 BURIED PIPING AND TANKS INSPECTION PROGRAM

Program Description

The Buried Piping and Tanks Inspection Program manages the aging effect of loss of material for the external surfaces of buried steel components in CR-3 systems within the scope of License Renewal. Components within the scope of the Program consist of steel piping components and two buried tanks. Not included are the underground concrete pipes connecting the Auxiliary Building to the Nuclear Service and Decay Heat Sea Water System Discharge Structure which are managed by the Structures Monitoring Program. The aging effects/mechanisms of concern are loss of material due to general, galvanic, pitting, and crevice corrosion and MIC. To manage the aging effects, this new program includes: (a) preventive measures to mitigate degradation (e.g. coatings and wrappings required by design), and (b) visual inspections of external surfaces of buried piping and tanks, when excavated, for evidence of coating damage and degradation.

Detailed procedural requirements for the Program will be developed and incorporated into implementing procedures. These procedures will provide the administrative controls for the Program and will: (1) ensure an appropriate as-found pipe coating and material condition inspection is performed whenever buried piping within the scope of this Program is exposed, with a minimum frequency of at least one buried piping inspection each 10 years, (2) verify that there is at least one opportunistic or focused inspection performed within the ten year period prior to the period of extended operation, (3) specify that an inspection datasheet is used, (4) require inspection results to be documented, (5) include precautions concerning excavation and use of backfill for License Renewal piping, (6) include a requirement that buried piping coating inspection shall be performed, when excavated, by qualified personnel to assess its condition, and (7) include a requirement that a coating engineer or other qualified individual (such as the Coatings Program Manager) should assist in evaluation of any buried piping coating damage and/or degradation found during the inspection. Any evidence of damage to the coating or wrapping, such as perforations, holidays or other damage will cause the protected components to be inspected for evidence of loss of material. The Program assures that the effects of aging on buried piping components are being effectively managed for the period of extended operation.

NUREG-1801 Consistency

The Buried Piping and Tanks Inspection Program is a new program that is consistent with NUREG-1801, Section XI.M34.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The Buried Piping and Tanks Inspection Program is a new program applicable to buried piping. There is no existing OE to validate the effectiveness of this Program. NUREG-1801 is based on industry OE through January 2005. Recent industry OE has been reviewed for applicability. More recent OE is captured through the normal OE review process where it is screened for applicability. This process will continue through the period of extended operation.

At CR-3, buried piping leaks have occurred in the Fire Protection System. These were evaluated and determined not to be caused by age-related degradation. Based on this site experience, it can be concluded that leaks in CR-3 buried piping have been detected and that appropriate corrective actions have been taken to ensure no loss of component intended function. This experience is not atypical and justifies the use of the 10-year inspection frequency for buried components endorsed by NUREG-1801.

Conclusion

Implementation of the Buried Piping and Tanks Inspection Program provides reasonable assurance that the aging effect of loss of material due to corrosion mechanisms will be managed such that systems and components within the scope of License Renewal will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.21 ONE-TIME INSPECTION OF ASME CODE CLASS 1 SMALL-BORE PIPING PROGRAM

Program Description

The industry has experienced cracking of small-bore piping as the result of thermal and mechanical loading and intergranular stress corrosion. Specific industry-identified events include cracking caused by fatigue due to thermal stratification which resulted in the issuance of NRC Bulletin 88-08, "Thermal Stresses in Piping Connected to Reactor Coolant System," (as supplemented). The ASME Code does not currently require volumetric examination of Class 1 small-bore piping. However, as stated in NUREG-1801, Section XI.M35, the NRC believes that the inspection of small-bore Class 1 piping (less than NPS 4) should include volumetric examinations to identify cracking. The CR-3 One-Time Inspection of ASME Code Class 1 Small-Bore Piping Program will manage this aging effect through the use of volumetric examinations. The current state of technology provides no effective, reliable method of performing volumetric examinations of small-bore socket welds. In lieu of performing volumetric inspections of socket welds, the Program will include one-time volumetric examinations of a sample of Class 1 butt welds for pipe less than NPS 4. The volumetric inspections will be completed prior to the end of, and within the last five years of, the current operating period. In addition, the Program will include controls to ensure that ASME Class 1 socket welds are inspected in accordance with the approved ASME Section XI ISI program. Any cracking identified in small-bore Class 1 piping determined to be attributable to stress corrosion or thermal and mechanical loading will result in periodic inspections to be managed by a plant-specific program.

The CR-3 One-Time Inspection of ASME Code Class 1 Small-Bore Piping Program will manage cracking in small-bore piping (less than NPS 4) such that the system intended function is maintained and loss of RCS pressure boundary does not occur through the period of extended operation. This Program will be implemented and inspections completed and evaluated prior to the period of extended operation.

NUREG-1801 Consistency

The CR-3 One-Time Inspection of ASME Code Class 1 Small-Bore Piping is a new program that is consistent with NUREG-1801, Section XI.M35.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

In 1982, CR-3 experienced a failure of a weld associated with the normal duty makeup line. A report was written as a means of documenting the activities of Florida Power Corporation and its contractors during the investigation and repair of the makeup system nozzle at Crystal River Unit 3. The report concluded in part that:

1. The leak path in the valve to safe end pipe weld was formed by the joining of a circumferential crack from the inside diameter (ID) with a circumferential crack from the outside diameter (OD).
2. The ID crack initiated at a machine tool mark in the valve body probably by thermal fatigue. Propagation probably occurred by combined mechanical and thermal loading.
3. The OD crack initiated at the discontinuity formed by the weld between the valve and safe end on the valve side. Crack initiation and propagation probably occurred by mechanical loading of the system.

The report posited two explanations that could account for hot RCS fluid backing up into the double duty line and resulting in a thermal cycle. One theory was that a loss of roll in the thermal sleeve could open up the annulus area in between the thermal sleeve and the nozzle. This would lead to a chimney affect drawing the hot RCS fluid through the annulus and lead to turbulent thermal mixing in the safe-end/thermal sleeve region. The second theory dealt with low flow velocity ratios between the RCS and normal and/or minimum makeup flow. There had been studies performed in the area of thermal shock mixing which indicates unusual and unexpected flow patterns as a function of flow velocity ratios. Further data at other B&W facilities on the HPI nozzle problem seemed to indicate that the loss of roll is a common denominator in this problem. That would tend to support the loss of roll theory.

During Refuel 13, in 2003, inspections were performed in accordance with B&W Topical Report, “HPI/MU Nozzle Component Cracking,” on three High-Pressure Injection (HPI) nozzles and associated piping up to the first isolation valves using ultrasonic techniques. Two HPI Nozzles Thermal Sleeves were examined by internal remote visual techniques. One HPI thermal sleeve was found to be cracked, and it was replaced.

Components with identified cracking are managed by the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program.

NUREG-1801 is based on industry OE through January 2005. Recent industry OE has been reviewed for applicability. More recent OE is captured through the normal OE review process where it is screened for applicability. This process will continue through the period of extended operation.

Conclusion

Based on this evaluation, there is reasonable assurance that, when implemented, the CR-3 One-Time Inspection of ASME Code Class 1 Small-Bore Piping Program will adequately manage cracking in small-bore Class 1 piping so that system intended functions will be maintained consistent with the CLB for the period of extended operation.

B.2.22 EXTERNAL SURFACES MONITORING PROGRAM

Program Description

The External Surfaces Monitoring Program is based on system inspections and walkdowns. This Program consists of periodic visual inspections of components such as piping, piping components, ducting, and other equipment within the scope of License Renewal and subject to aging management review in order to manage aging effects. The Program manages aging effects through visual inspection of external surfaces. Loss of material due to boric acid corrosion is managed by the Boric Acid Corrosion Program. Surfaces that are inaccessible during plant operations are inspected during refueling outages. The Program includes measures to provide assurance that aging effects are managed on surfaces that are inaccessible during both plant operations and refueling outages.

NUREG-1801 Consistency

The External Surfaces Monitoring Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.M36.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the below-listed enhancements will be implemented:

<u>Program Elements Affected</u>

- **Scope of Program**
  1) Implementing procedures will be enhanced to ensure that the Program encompasses all of the systems and components that credit the Program for aging management.

  2) Program procedures will be enhanced to include inspection attributes adequate for identifying aging effects for the ranges of materials and aging effects within the scope of the Program.

  3) Implementing procedures will be enhanced to include measures to assure that aging effects are managed on surfaces that are inaccessible or not readily visible during both plant operations and refueling outages, such that reasonable

assurance is provided that applicable components will perform their intended function during the period of extended operation.

- **Parameters Monitored/Inspected**
  Program procedures will be enhanced to detect aging effects/mechanisms and qualify degradations consistent with the demand of components crediting the External Surfaces Monitoring Program for aging management. Identified aging effects include loss of material, hardening and loss of strength of elastomers, and reduction of heat transfer caused by fouling.

- **Detection of Aging Effects**
  1) Program procedures will be revised to include inspection attributes regarding the degradation of coatings.

  2) Enhancement 3) under Scope of Program above regarding inspection of inaccessible surfaces of components is applicable to this element also.

Operating Experience

System monitoring activities at CR-3 have proven to be effective in maintaining the material condition of plant systems. System folders are maintained documenting information regarding system health, including performance monitoring and results of system walkdowns. Action Requests are initiated as needed to identify and resolve deficiencies, including material condition. A review of system health reports from the most recent reporting period (January to June 2008) confirms that system walkdowns are being performed in a timely manner, that results are being trended, that longstanding items are identified and resolved, that plans are developed and implemented to optimize system health, and that systems are being effectively monitored.

The effectiveness of systems monitoring, including system walkdowns, has been the subject of both focused and site-wide self assessments. These assessments have evaluated timeliness and frequency requirements, documentation requirements, system engineer training, and the overall effectiveness of system walkdowns. Improvements have been made as a result of these assessments, including use of PassPort for implementing walkdown schedules, and formalization of frequency and documentation requirements. These assessments have concluded that CR-3 is effectively executing system walkdowns.

Conclusion

Implementation of the External Surfaces Monitoring Program, with the enhancements identified above, will provide reasonable assurance that the aging effects will be adequately managed such that the components within the scope of License Renewal will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.23 INSPECTION OF INTERNAL SURFACES IN MISCELLANEOUS PIPING AND DUCTING COMPONENTS PROGRAM

Program Description

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program is a new program that will be implemented via existing preventive maintenance, surveillance testing, and periodic testing work order tasks that provide opportunities for the visual Inspection of internal surfaces of piping and ducting components. Periodic internal inspections of components allow timely detection of degradation and determination of appropriate corrective actions. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program work activities will monitor parameters that may be detected by visual inspection and include change in material properties, cracking, flow blockage, hardening, loss of material, and reduction of heat transfer effectiveness. In addition to visual inspection of internal surfaces, the program includes a limited scope of preventive maintenance activities that involve 1) physical manipulation or other investigative methods to detect aging effects, and 2) inspection of outside surfaces. The extent and schedule of inspections and testing assure detection of component degradation prior to loss of intended functions.

NUREG-1801 Consistency

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program is a new program consistent with NUREG-1801, Section XI.M38.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program is a new program; and, as such, no OE exists for a demonstration of program effectiveness. The Program will be implemented via existing preventive maintenance, surveillance testing, and periodic testing work order tasks. Such tasks have been in place at CR-3 since the plant began operation. These activities have proven effective at maintaining the material condition of systems, structures, and components and detecting unsatisfactory conditions. System Engineers review OE for possible impact to the equipment in their systems. The basis for parameters monitored and inspection intervals will be based on vendor recommendations, historical performance, and industry wide OE. Operating experience is disseminated and evaluated as described in the Operating Experience Program. This ongoing review of OE will continue through the period of extended operation.

Conclusion

Implementation of the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program provides reasonable assurance that applicable aging effects will be managed such that the components within the scope of License Renewal will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.24 LUBRICATING OIL ANALYSIS PROGRAM

Program Description

The purpose of the Lubricating Oil Analysis Program is to ensure the oil environment in mechanical systems is maintained to the required quality. The Lubricating Oil Analysis Program maintains oil system contaminants (primarily water and particulates) within acceptable limits, thereby preserving an environment that is not conducive to loss of material, cracking, flow blockage, or reduction of heat transfer. Lubricating oil testing activities include sampling and analysis of lubricating oil for detrimental contaminants. The program also implements periodic oil changes at fixed intervals for selected components; a particle count and check for water are performed on the old oil prior to disposal to detect evidence of abnormal wear rates, contamination by moisture, or excessive corrosion.

NUREG-1801 Consistency

The Lubricating Oil Analysis Program is an existing program that is consistent with NUREG-1801, Section XI.M39, with exception.

Exceptions to NUREG-1801

Program Elements Affected

- **Parameters Monitored/Inspected**
  The Lubricating Oil Analysis Program does not measure flash point on a periodic basis. Flash point is only measured upon receipt inspection or on systems where a combustible gas may accumulate. CR-3 has no lube oil reservoirs where a combustible gas may accumulate above the lube oil. Therefore, this test is not warranted.

Enhancements

None.

Operating Experience

The Lubricating Oil Analysis Program utilizes OE to promote the identification and transfer of lessons learned from both internal and industry events so that the knowledge gained can be used to improve nuclear plant safety and operations. The Program provides the methodology for receiving, processing, status reporting, screening, reviewing, evaluating, and taking preventative and corrective actions in response to applicable OE information. Examples of plant-specific OE are provided below to demonstrate program effectiveness:

- A CR-3 NCR reported that a routine lube oil sample for the outboard motor bearing of a Circulating Water Pump discovered visible ferrous wear debris. This was an indication the motor bearing had degraded to a point where replacement was likely necessary. Because of this finding, pump operation was restricted until the motor could be refurbished or replaced.

- Another NCR indicated that a routine lube oil sample collected following the replacement of a Decay Heat Pump rotating assembly was discolored. It was suspected that this discoloration was due to break-in wear of the pump bearings. A sample was shipped to oil analysis vendor for further analysis. A Work Order was initiated to drain, flush, and refill the pump bearing reservoir. The affected pump will be carried on the Predictive Maintenance Observation and Action list as an increased frequency monitoring item until wear particle analysis results have returned to normal.

The review of OE shows that the Lubricating Oil Analysis Program is continually upgraded based on industry experience, external and internal assessments, and routine program performance, and has proven effective in maintaining lube oil quality for site equipment. The overall effectiveness of the Lubricating Oil Analysis Program is supported by the OE for systems and components in that no instances of failures attributed to lubricating oil contamination have been identified.

Conclusion

Implementation of the Lubricating Oil Analysis Program will provide reasonable assurance that applicable aging effects will be managed such that the in-scope components subject to a lubricating oil environment will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.25 ASME SECTION XI, SUBSECTION IWE PROGRAM

Program Description

The ASME Section XI, Subsection IWE Program consists of periodic inspections of Class MC components of the containment structure. The Program is in accordance with the ASME Code, Section XI, Subsection IWE, 2001 Edition through the 2003 Addenda as modified by 10CFR50.55a. The ASME Section XI, Subsection IWE Program is credited for the aging management of the:

1. Metallic liner and integral attachments for the concrete containment,
2. Penetration sleeves,
3. Personnel airlock and equipment hatch,
4. Pressure retaining bolting, and
5. Moisture barriers.

The primary inspection method for the ASME Section XI, Subsection IWE Program is periodic visual examination along with limited volumetric examinations utilizing ultrasonic thickness measurements as needed.

NUREG-1801 Consistency

The ASME Section XI Subsection IWE Program is an existing program consistent with NUREG-1801, Section XI.S1.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The ASME Section XI, Subsection IWE Program is implemented and maintained in accordance with the general requirements for engineering programs. This provides assurance that the Program is effectively implemented to meet regulatory, process, and procedure requirements. Periodic program reviews are performed. The Program is upgraded based on industry and plant-specific experience. Additionally, plant OE is shared among Program personnel at all four of Progress Energy nuclear plant sites.

Plant-specific operating history includes several general visual examinations that were performed on the Reactor Building (RB) liner plate, penetrations, bolting and associated attachments. These examinations have identified instances of age-related degradation of the liner plate caused by general and pitting corrosion, general corrosion of penetrations, deterioration of the moisture barrier at the liner/floor interface, deteriorated cork material under the moisture barrier, and liner plate coating degradation. Corrective actions were taken to assure the intended function of the liner and to repair or replace the degraded components. The moisture barrier was completely removed and the deteriorated cork material below the moisture barrier was replaced. The liner plate was recoated, the cork was installed, and moisture barrier was replaced. The structural integrity of the RB liner plate was not degraded beyond its design margin. The corrosion on the penetrations was evaluated as minor surface corrosion that did not impact the structural integrity of the penetrations. An NCR report was initiated to monitor corrosion of the liner during future outages to determine if further compensatory actions need to be taken. In addition, a detailed visual examination of the condition of the moisture barrier at the liner/floor interface has been planned for a future outage.

Industry and site OE demonstrates the Program is effective at detecting and managing aging affects so that the intended functions of the applicable components will be maintained during the period of extended operation.

Conclusion

Continued implementation of the ASME Section XI, Subsection IWE Program will provide reasonable assurance that the aging effects of pressure retaining Containment Structure Class MC components are adequately managed so that the intended functions of the applicable components will be maintained during the period of extended operation.

B.2.26 ASME SECTION XI, SUBSECTION IWL PROGRAM

Program Description

The ASME Section XI, Subsection IWL Program is implemented in accordance with 10 CFR 50.55(a) and ASME Section XI, Subsection IWL, 2001 Edition, through the 2003 Addenda. The Program manages the reinforced concrete and unbonded post-tensioning system of the CR-3 Class CC containment structure. The Program requires periodic inspection of the reinforced concrete Reactor Building (RB) and inspection and testing of a sample of the unbonded post-tensioning system as specified by ASME Section XI, Subsection IWL. The Program includes ASME Section XI, Subsection IWL, examination categories L-A, for concrete surfaces, and L-B, for the unbonded post-tensioning system. The second ASME Section XI, Subsection IWL Program interval began on August 14, 2008.

NUREG-1801 Consistency

The ASME Section XI, Subsection IWL Program is an existing program consistent with NUREG-1801, Section XI.S2.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The ASME Section XI, Subsection IWL Program is implemented and maintained in accordance with the general requirements for engineering programs. This provides assurance that the Program is effectively implemented to meet regulatory, process, and procedure requirements. Periodic program reviews are performed. The Program is upgraded based on industry and plant-specific experience. Additionally, plant OE is shared among Program personnel at all four of Progress Energy nuclear plant sites.

Plant-specific OE includes the results of periodic examinations of the RB reinforced pressure boundary concrete and tendon surveillances. The 30th year examination of the RB reinforced pressure boundary concrete and the 8th Tendon Surveillance were completed in the Fall of 2007 during Refueling Outage 15.

Past examinations performed on concrete surfaces have identified several indications including staining from grease and rust, discoloration, voids, honeycomb, popouts, minor cracks of less than 0.04 in. across, spalling, efflorescence, deflection, items embedded in concrete protruding from concrete, and displacement and deterioration of grout. These items were documented and dispositioned as minor in nature and not adversely affecting the overall structural integrity of the RB. The evaluation attributed the suspect concrete areas to normal aging of the structure following exposure to the environment for approximately 30 years.

Previous Tendon Surveillance results have identified several instances where tendons have been found with lift-off forces below the Predicted Base Value. Historically, CR-3 has found numerous tendons below 95% of predicted base value, but has demonstrated the acceptability of the RB with the as-found conditions. Small grease and oil leaks were also identified on multiple tendon caps, located inside existing structures that adjoin the RB. This is not considered to be system degradation. Inspection results also identified several instances of missing or broken wires. These instances were compared against the acceptance criteria and found to be acceptable. One tendon exceeded 10% of net volume absolute difference between the amount of grease removed and the amount replaced. The condition was reviewed and found acceptable. The evaluations of OE to date have concluded that the CR-3 containment structure is functioning as designed and that the RB structure meets code requirements and has experienced no abnormal degradation of the post-tensioning system.

NRC Information Notice (IN) 99-10, "Degradation of Prestressing Tendon Systems in Prestressed Concrete Containments," was reviewed for applicability to CR-3. It was determined that the procedure used to control the tendon surveillance addressed the issues contained in the IN. The data for the CR-3 tendon history was informally reviewed using regression analysis, and the results did not vary appreciably from trending the group averages. The implementing procedure requires CR-3 to trend the group averages. Based on this review it was determined that there were no actions required as a result of IN 99-10.

Industry and site OE demonstrates the ASME Section XI, Subsection IWL Program is effective at detecting and managing aging affects so that the intended functions of the applicable components will be maintained during the period of extended operation.

Conclusion

Continued implementation of the ASME Section XI, Subsection IWL Program will provide reasonable assurance that the aging effects of the RB pressure-retaining reinforced concrete and unbonded post-tensioning system are adequately managed so that the intended functions of the applicable components will be maintained during the period of extended operation.

B.2.27 ASME SECTION XI, SUBSECTION IWF PROGRAM

Program Description

The CR-3 ASME Section XI, Subsection IWF Program provides for visual examination of component and piping supports within the scope of License Renewal for loss of material, change in material properties, and loss of mechanical function. The Program is implemented through plant procedures, which provide for visual examination of ISI Class 1, 2, and 3 supports. Visual examination is provided in accordance with the requirements of ASME Section XI, Subsection IWF, 2001 Edition, through the 2003 Addenda, as modified by 10 CFR 50.55a. The ASME Section XI, Subsection IWF program is credited for the aging management of the supports for ASME Class 1, 2, 3 piping and components and supports for Reactor Coolant System primary equipment.

NUREG-1801 Consistency

The CR-3 ASME Section XI, Subsection IWF Program is an existing program consistent with NUREG-1801, Section XI.S3.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The ASME Section XI, Subsection IWF Program is implemented and maintained in accordance with the general requirements for engineering programs. This provides assurance that the Program is effectively implemented to meet regulatory, process, and procedure requirements, including periodic reviews; qualified personnel are assigned as program managers and are given authority and responsibility to implement the Program; and adequate resources are committed to Program activities.

Plant-specific OE has identified numerous assessments, performed on both a plant-specific and corporate basis, dealing with program development, effectiveness, and implementation. The CR-3 IWF Program is continually being upgraded based upon industry and plant specific experience. Additionally, plant OE is shared between Progress Energy sites through regular peer group meetings, a common corporate sponsor, and outage participation of program managers from other Progress Energy sites.

An example of use of the Corrective Action Program occurred following the identification of a corroded support located in the Sea Water Room of the Auxiliary Building during a scheduled inservice inspection. The remaining supports in the same trench were inspected and also found to be corroded. Thus, the Corrective Action Program was used to identify and replace the affected supports with an improved support design. Another example of using the Corrective Action Program in this manner was the identification and replacement of degraded supports in the RB.

Conclusion

Continued implementation of the CR-3 ASME Section XI, Subsection IWF Program will provide reasonable assurance that the aging effects are managed such that the components/commodities within the scope of this Program will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.28 10 CFR PART 50, APPENDIX J PROGRAM

Program Description

The 10 CFR 50, Appendix J Program is an existing performance-based testing program. The program monitors leakage rates through the containment pressure boundary, including penetrations and access openings. Containment leak rate tests assure that leakage through the primary containment, and systems and components penetrating primary containment, do not exceed the allowable leakage limits specified within the CR-3 Technical Specifications. Corrective actions are taken if leakage rates exceed established administrative limits for individual penetrations or the overall containment pressure boundary. Seals and gaskets are also monitored under the program. The CR-3 10 CFR 50, Appendix J Program utilizes the performance-based approach of 10 CFR 50, Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors," Option B, and includes appropriate guidance from Regulatory Guide 1.163, September 1995, "Performance-Based Containment Leak-Test Program," as modified by NEI 94-01, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50 Appendix J."

Type A tests are conducted to measure the containment overall integrated leakage rate. Plant procedures require a general visual inspection of the accessible interior and exterior surfaces of the primary containment and components prior to each integrated leak rate test (ILRT). Type B and Type C local leak rate tests (LLRTs) are performed on containment pressure boundary access penetrations and containment isolation valves 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 Program is an existing program consistent with NUREG-1801, Section XI.S4.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The 10 CFR Part 50, Appendix J Program is maintained in accordance with CR-3 engineering program requirements. This provides assurance that the Program is effectively implemented to meet regulatory, process, and procedure requirements, including periodic reviews; that qualified personnel are assigned as program managers and are given authority and responsibility to implement the Program; and that adequate resources are committed to Program activities.

The Containment ILRT was last performed in December, 2005 during Refueling Outage 14. The ILRT test results were satisfactory with no corrective or follow-up actions initiated. In addition, site OE confirms that the LLRTs are effective in identifying and initiating corrective actions for leakage at containment penetrations, including the equipment hatch and air locks, and in confirming the effectiveness of the corrective actions taken.

Examples of plant-specific OE are the identification of leakage and implementation of corrective actions for containment isolation valves that failed LLRTs. The following examples are typical of the effective methods used at CR-3 for identifying and correcting valve leakage problems.

- In one case, a Containment Isolation Valve failed the LLRT and was disassembled and inspected. The valve disc was replaced and the as-left LLRT was satisfactory.

- In a second case, failure of a LLRT in 2003 resulted in the valve stroke being adjusted because the internal inspection of the valve revealed no problems. The same valve failed a second test in 2007. Long-term corrective actions were planned to repair the valve during the next refueling outage since overall leakage was acceptable. During the next refueling the valve again failed leak rate testing and was subsequently disassembled and rebuilt. However, plans for replacing the valve were implemented when the valve again failed the LLRT.

Based on review of operating history, corrective actions, and self-assessments, the 10 CFR Part 50, Appendix J Program is continually monitored and enhanced to incorporate the results of OE; as such it provides an effective means of ensuring the structural integrity and leak tightness of the CR-3 containment.

Conclusion

Continued implementation of the 10 CFR Part 50, Appendix J Program will provide reasonable assurance that applicable aging effects are managed such that the components/commodities within the scope of this Program will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.29 MASONRY WALL PROGRAM

Program Description

The objective of the Masonry Wall Program is to manage aging effects so that the evaluation basis established for each masonry wall within the scope of License Renewal remains valid through the period of extended operation. The Program includes masonry walls identified as performing intended functions in accordance with 10 CFR 54.4. Included walls are the masonry walls within the Auxiliary Building, Control Complex, Turbine Building, Fire Service Pumphouse and the Switchyard Relay Building. The Program is a condition monitoring program with the inspection frequencies established such that no loss of intended function would occur between inspections.

NUREG-1801 Consistency

The Masonry Wall Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.S5.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the below-listed enhancements will be implemented:

<u>Program Elements Affected</u>

- **Scope of Program**
  Revise Program administrative controls to identify the structures that have masonry walls in the scope of License Renewal.

Operating Experience

The CR-3 Masonry Wall Program was implemented on the schedule mandated by 10 CFR 50.65, the Maintenance Rule. A baseline inspection of masonry walls in the scope of Maintenance Rule was completed in 1997. A subsequent inspection of structures was completed in 2007 consistent with the program frequency of at least one inspection every ten years.

The 2007 Maintenance Rule inspection of Masonry Walls identified no degradation that impacted the intended functions of the walls. The baseline inspection performed in 1997 identified no unacceptable conditions for masonry walls.

The Masonry Wall Program is conducted through a corporate procedure that is implemented and maintained in accordance with the general requirements for engineering programs. This provides assurance that the Masonry Wall Program is effectively implemented to meet regulatory, process, and procedural requirements, including periodic reviews; that qualified personnel are assigned as program managers and are given the authority and responsibility to implement the Masonry Wall Program; and that adequate resources are committed to Program activities.

Inspections and assessments have been conducted and show the Masonry Wall Program through the Maintenance Rule Program to be critically monitored, and continually improving. The OE review has concluded that administrative controls are in effect and effective in identifying age related degradation and initiating corrective action.

Conclusion

Following enhancement, implementation of the Masonry Wall Program will ensure the effects of aging associated with masonry walls in the scope of License Renewal will be adequately managed so that there is reasonable assurance that their intended functions will be performed consistent with the CLB during the period of extended operation.

B.2.30 STRUCTURES MONITORING PROGRAM

Program Description

The Structures Monitoring Program manages the aging effects of civil/structural commodities within the scope of License Renewal. The Structures Monitoring Program is implemented, through procedures, in accordance with the regulatory requirements and guidance associated with the Maintenance Rule, 10 CFR 50.65; NRC Regulatory Guide 1.160, “Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,” Rev. 2, and Nuclear Energy Institute (NEI) 93-01, “Industry Guidelines for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,” Rev. 2. The Program incorporates criteria recommended by the Institute for Nuclear Power Operations (INPO) Good Practice document 85-033, “Use of System Engineers;” NEI 96-03, “Guidelines for Monitoring the Condition of Structures at Nuclear Plants,” and inspection guidance based on industry experience and recommendations from American Concrete Institute Standard ACI 349.3R-96, “Evaluation of Existing Nuclear Safety-Related Concrete Structures;” and American Society of Civil Engineers, ASCE 11-90, “Guideline for Structural Condition Assessment of Existing Buildings.” The Program consists of periodic inspection and monitoring of the condition of structures and structure component supports to ensure that aging degradation leading to loss of intended functions will be detected and that the extent of degradation can be determined.

NUREG-1801 Consistency

The Structures Monitoring Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.S6.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the below-listed enhancements will be implemented:

<u>Program Elements Affected</u>

- **Scope of Program**
  Administrative controls that implement the Program will be revised to:
  1) Specifically identify the License Renewal structures and systems that credit the Program for aging management in the corporate procedure for condition monitoring of structures,

2) Require notification of the responsible engineer when below-grade concrete, including concrete pipe, is exposed so an inspection may be performed prior to backfilling,

3) Require periodic inspections of water control structures, i.e., Circulating Water Intake Structure, Circulating Water Discharge Structure, Nuclear Service Sea Water Discharge Structure, Intake Canal, and Raw Water Pits, on a frequency not to exceed five years,

4) Require periodic inspections of the Circulating Water Intake Structure submerged portions on a frequency not to exceed five years,

5) Require periodic groundwater chemistry monitoring including consideration for potential seasonal variations,

6) Require inspection of inaccessible surfaces of reinforced concrete pipe when exposed due to removal of backfill for any reason in the corporate procedure for condition monitoring of structures, and

7) Include additional in-scope structures and specific civil/structural commodities in periodic maintenance activities.

- **Parameters Monitored/Inspected**
  Administrative controls that implement the Program will be revised to:
  1) Identify additional civil/structural commodities along with the associated inspection attributes and performance standard required for License Renewal in the corporate procedure for condition monitoring of structures,

  2) Require notification of the Responsible Engineer when below-grade concrete including concrete pipe is exposed so an inspection may be performed prior to backfilling,

  3) Require inspection of inaccessible surfaces of reinforced concrete pipe when exposed due to removal of backfill for any reason in the corporate procedure for condition monitoring of structures,

  4) Identify additional inspection criteria for structural commodities in the site system walkdown checklist,

  5) Add inspection for corrosion to the inspection criteria for the bar racks at the Circulating Water Intake Structure as a periodic maintenance activity,

  6) Add an inspection of the earth for loss of form and loss of material for the Wave Embankment Protection Structure as a periodic maintenance activity,

7) Require inspection of the Fluorogold slide bearing plates used in structural steel platform application located in the Reactor Building on an established frequency.

Operating Experience

The CR-3 Structures Monitoring Program was implemented on the schedule mandated by 10 CFR 50.65(a) for the Maintenance Rule (MR). A baseline inspection of structures in the scope of MR was completed in 1997. A subsequent inspection of structures was completed in 2007 consistent with the program frequency of not exceeding ten years. Periodic walkdowns of MR systems, including inspection of structural features, have also been performed. Intake Canal surveys for proper dimensions have been performed on a minimum frequency of every four years. The 2007 MR inspection of structures identified no significant degradation that impacted the intended functions of the structures and structural components. Corrosion of steel components was identified in several structures, e.g., equipment supports in the Auxiliary Building Seawater Room, support steel at the Circulating Water Intake Structure, the Borated Water Storage Tank enclosure, and a cable vault. Corrosion of steel members of the East Cable Bridge was identified, and a re-inspection was scheduled to be completed in 2008. Evidence of water intrusion was observed in the Tendon Access Gallery, the Decay Heat Vaults, and a cable vault. A hairline crack on the concrete wall of the Spent Fuel Pool was re-inspected and has not increased in size since the last inspection. The interval for this inspection has been established as yearly.

System Engineering walkdowns and use of the Corrective Action Program (CAP) by plant personnel have identified deficiencies on structural features. A review of the CAP back to 1999 identified several instances of corrosion on steel commodities such as supports, anchors, bolts, door hinges, and siding. The primary deficiencies for concrete were cracking, spalling, and leaching. Loss of material due to washout on the Berm was identified. Deterioration of elastomeric materials in the flood barrier, access plugs, door seals, and roof seals was identified. Water intrusion was identified in several below grade areas and was corrected through the CAP.

During 2005, a significant adverse condition associated with water intrusion into the Emergency Diesel Generator 1A Fuel Oil Storage Tank was identified, and an investigation was performed. As a result, the flood protection system surveillance was enhanced to include an inspection for structural condition of the concrete flood retaining wall and watertight seals. The Structures Monitoring Program credits this flood protection system surveillance.

As a result of the Intake Canal surveys, the CR-3 Intake Canal has been dredged twice since operation began in 1976: in 1989 and in 2004.

A review of inspection reports, self-assessments, and adverse condition reports has concluded the administrative controls are in effect, effective in identifying age related degradation, implementing appropriate corrective actions, and continually upgrading the administrative controls used for structures monitoring.

Conclusion

Following enhancement, implementation of the Structures Monitoring Program will ensure the effects of aging, associated with License Renewal civil/structural commodities, will be adequately managed so that there is reasonable assurance that their intended functions will be performed consistent with the CLB during the period of extended operation.

B.2.31 ELECTRICAL CABLES AND CONNECTIONS NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS PROGRAM

Program Description

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is credited for the aging management of cables and connections not included in the CR-3 EQ Program. Accessible electrical cables and connections installed in adverse localized environments are visually inspected at least once every 10 years for cable and connection jacket surface anomalies, such as embrittlement, discoloration, cracking, swelling, or surface contamination, which are precursor indications of conductor insulation aging degradation from heat, radiation or moisture. An adverse localized environment is a condition in a limited plant area that is significantly more severe than the specified service condition for the electrical cable or connection. The first inspections for license renewal will be completed before the period of extended operation. The aging effects/mechanisms of concern are as follows:

- Reduced Insulation Resistance
- Electrical Failure

The technical basis for selecting the sample of cables and connections to be inspected is defined in the implementing CR-3 program document. Sample locations will consider the location of cables and connections inside and outside Containment, as well as, any known adverse localized environments.

NUREG-1801 Consistency

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is a new program consistent with NUREG-1801, Section XI.E1.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is a new program with no site specific OE history. However, plant-specific and industry-wide OE was considered in the development of all electrical programs in Appendix B of the CR-3 License Renewal Application. The review of plant-specific and industry-wide OE ensures that the corresponding NUREG-1801, Chapter XI, Program will be an effective aging management program for the period of extended operation. Plant-specific OE for cables and connections has been captured by a review of one or more of the following: (1) the Action Tracking database, (2) System Engineering Notebooks and System Health Reports, and (3) discussions with site engineering personnel. This effort also included a review of applicable site correspondence (Licensee Event Reports, etc).

Industry OE that forms the basis for this program is included in the OE element of the corresponding NUREG-1801, Chapter XI, Program. Industry OE noted in NUREG-1801, has shown that adverse localized environments caused by heat, radiation or moisture for electrical cables and connections have been shown to exist and have been found to produce degradation of insulating materials that is visually observable. These visual indications, such as color changes or surface cracking, can be used as indicators of degradation.

This review of plant-specific and industry-wide OE confirms that the OE discussed in the corresponding NUREG-1801, Chapter XI, Program is bounding, i.e., that there is no unique, plant-specific OE in addition to that in NUREG-1801. Going forward, OE will be captured through the CR-3 Corrective Action and Operating Experience Programs implemented in accordance with Progress Energy corporate procedures. This ongoing review of OE will continue throughout the period of extended operation, and the results will be maintained on site. The administrative controls that implement the Corrective Action and Operating Experience Programs are implemented in accordance with the CR-3 QA Program, which is in conformance with 10 CFR 50, Appendix B. This process will verify that all electrical programs credited for License Renewal will continue to be effective in the management of aging effects.

Conclusion

Implementation of the Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program will provide reasonable assurance that the aging effects will be managed such that the components within the scope of License Renewal will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.32 ELECTRICAL CABLES AND CONNECTIONS NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS USED IN INSTRUMENTATION CIRCUITS PROGRAM

Program Description

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program is credited for the aging management of radiation monitoring and nuclear instrumentation cables not included in the CR-3 EQ Program. Exposure of electrical cables to adverse localized environments caused by heat, radiation, or moisture can result in reduced insulation resistance (IR). A reduction in IR is a concern for circuits with sensitive high voltage, low-level signals such as radiation monitoring and nuclear instrumentation circuits since it may contribute to signal inaccuracies. For radiation monitoring circuits and the Gamma Metrics circuits, the review of calibration results or findings of surveillance testing will be used to identify the potential existence of cable system aging degradation. This review will be performed at least once every 10 years, with the first review to be completed before the end of the current license term. Power range cable systems used in the Excore Monitoring System will be tested at a frequency not to exceed once every 10 years based on engineering evaluation, with the first testing to be completed before the end of the current license term. Testing may include IR tests, time domain reflectometry (TDR) tests, current versus voltage (I/V) testing, or other testing judged to be effective in determining cable system insulation condition. The aging effects of concern are as follows:

- Reduced Insulation Resistance
- Electrical Failure

The scope of this Program applies to non-EQ cable systems used in radiation monitoring instrumentation circuits and neutron flux monitoring instrumentation circuits that are sensitive to a reduction in IR. NUREG-1801 Section XI.E1 is not applicable to the cables utilized in these instrumentation circuits.

NUREG-1801 Consistency

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program is a new program consistent with NUREG-1801, Section XI.E2.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program is a new program with no site specific OE history. However, plant-specific and industrywide OE was considered in the development of all electrical programs in Appendix B of the CR-3 License Renewal Application. The review of plant-specific and industry-wide OE ensures that the corresponding NUREG-1801, Chapter XI, Program will be an effective aging management program for the period of extended operation. Plant-specific OE for non-EQ electrical cables and connections used in instrumentation circuits has been captured by a review of one or more of the following: (1) the Action Tracking database, (2) System Engineering Notebooks and System Health Reports, and (3) discussions with site engineering personnel. This effort also included a review of work management records and applicable site correspondence (Licensee Event Reports, etc.).

Industry OE that forms the basis for this program is included in the OE element of the corresponding NUREG-1801, Chapter XI, Program. Industry OE noted in NUREG-1801 has shown that exposure of electrical cables to adverse localized environments caused by heat, radiation, or moisture can result in reduced IR. Reduced IR causes an increase in leakage currents between conductors and from individual conductors to ground. A reduction in IR is a concern for circuits with sensitive high voltage, low-level signals such as radiation monitoring and nuclear instrumentation circuits since it may contribute to signal inaccuracies.

This review of plant-specific and industry-wide OE confirms that the OE discussed in the corresponding NUREG-1801, Chapter XI, Program is bounding, i.e., that there is no unique, plant-specific OE in addition to that in NUREG-1801. Going forward, OE will be captured through the CR-3 Corrective Action and Operating Experience Programs implemented in accordance with Progress Energy corporate procedures. This ongoing review of OE will continue throughout the period of extended operation, and the results will be maintained on site. The administrative controls that implement the Corrective Action and Operating Experience Programs are implemented in accordance with the CR-3 QA Program, which is in conformance with 10 CFR 50, Appendix B. This process will verify that all electrical programs credited for License Renewal will continue to be effective in the management of aging effects.

Conclusion

Implementation of the Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program will provide reasonable assurance that the intended functions of non-EQ electrical cables and connections used in instrumentation circuits with sensitive high voltage, low-level signals exposed to adverse localized environments caused by heat, radiation, or moisture will be maintained consistent with the current licensing basis through the period of extended operation.

B.2.33 INACCESSIBLE MEDIUM-VOLTAGE CABLES NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS PROGRAM

Program Description

The Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is credited for aging management of cables not included in the CR-3 EQ Program. In-scope, medium-voltage cables exposed to significant moisture and significant voltage are tested at least once every 10 years to provide an indication of the condition of the conductor insulation. The specific type of test performed will be determined prior to the initial test, and is to be a proven test for detecting deterioration of the insulation system due to wetting, such as power factor, partial discharge, polarization index, or other testing that is state-of-the-art at the time the test is performed. Significant moisture is defined as periodic exposures that last more than a few days (e.g., cable in standing water). Periodic exposures that last less than a few days (e.g., normal rain and drain) are not significant. Significant voltage exposure is defined as being subjected to system voltage for more than 25% of the time. Manholes associated with inaccessible non-EQ medium-voltage cables will be inspected for water accumulation and drained, as needed. The manhole inspection intervals will be based on actual field data and shall not exceed two years. The first test and inspections for License Renewal will be completed before the period of extended operation.

NUREG-1801 Consistency

The Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is a new program consistent with NUREG-1801, Section XI.E3.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is a new program with no OE history. However, plant-specific and industry-wide OE was considered in the development of all electrical programs in Appendix B of the CR-3 License Renewal Application. The review of plant-specific and industry-wide OE ensures that the corresponding NUREG-1801, Chapter XI, Program will be an effective aging management program for the period of extended operation. Plant-specific OE for medium-voltage cables has been captured by a review of one or more of the following: (1) the Action Tracking database, (2) System Engineering Notebooks and System Health Reports, and (3) discussions with site engineering personnel. This effort also included a review of applicable site correspondence (Licensee Event Reports, etc.). Plant-specific OE for the medium voltage cables is captured in the CR-3 response to Generic Letter 2007-01, Serial: 3F0507-06 dated May 3, 2007.

Industry OE that forms the basis for this program is included in the OE element of the corresponding NUREG-1801, Chapter XI, Program. Industry OE noted in NUREG-1801 has shown that cross-linked polyethylene or high molecular weight polyethylene insulation materials are most susceptible to water tree formation. The formation and growth of water trees varies directly with operating voltage; for example, treeing is much less prevalent in 4KV cables than those operated at 13KV or 33KV. Also, minimizing exposure to moisture minimizes the potential for the development of water treeing.

This review of plant-specific and industry-wide OE confirms that the OE discussed in the corresponding NUREG-1801, Chapter XI, Program is bounding, i.e., that there is no unique, plant-specific OE in addition to that in NUREG-1801. Going forward, OE will be captured through the CR-3 Corrective Action and Operating Experience Programs implemented in accordance with Progress Energy corporate procedures. This ongoing review of OE will continue throughout the period of extended operation, and the results will be maintained on site. The administrative controls that implement the Corrective Action and Operating Experience Programs are implemented in accordance with the CR-3 QA Program, which is in conformance with 10 CFR 50, Appendix B. This process will verify that all electrical programs credited for License Renewal will continue to be effective in the management of aging effects.

Conclusion

Implementation of the Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program will provide reasonable assurance that the intended functions of inaccessible non-EQ medium-voltage cables exposed to adverse localized equipment environments caused by moisture while energized will be maintained consistent with the CLB through the period of extended operation.

B.2.34 METAL ENCLOSED BUS PROGRAM

Program Description

The Metal Enclosed Bus (MEB) Program is credited for aging management of all non-segregated 4.16KV and 250/125VDC MEB within the scope of License Renewal. The Program involves various activities conducted at least once every 10 years to identify the potential existence of aging degradation. In this Program, a sample of accessible bolted connections will be checked for loose connection by using thermography or by measuring connection resistance using a low range ohmmeter. In addition, the internal portions of the bus enclosure will be visually inspected for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of moisture intrusion. The bus insulation will be visually inspected for signs of embrittlement, cracking, melting, swelling, or discoloration, which may indicate overheating or aging degradation. The internal bus supports will be visually inspected for structural integrity and signs of cracks. The first test and inspections for license renewal will be completed before the period of extended operation.

As an alternative to thermography or measuring connection resistance of bolted connections, for the accessible bolted connections that are covered with heat shrink tape, sleeving, insulating boots, etc., visual inspection of the insulation material may be used to detect surface anomalies, such as discoloration, cracking, chipping or surface contamination. If this alternative visual inspection is used to check bolted connections, the first inspection will be completed before the period of extended operation and every five years thereafter.

NUREG-1801 Consistency

The Metal Enclosed Bus Program is a new program consistent with NUREG-1801, Section XI.E4.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

This is a new aging management program for MEB. Therefore, there is no existing site specific OE to validate the effectiveness of this program. However, plant-specific and industry-wide OE was considered in the development of all electrical programs in Appendix B of the CR-3 LR Application. The review of plant-specific and industry-wide

OE ensures that the corresponding NUREG-1801, Chapter XI, Program will be an effective aging management program for the period of extended operation. Plant-specific OE for MEB has been captured by a review of one or more of the following: (1) the Action Tracking database, (2) System Engineering Notebooks and System Health Reports, and (3) discussions with site engineering personnel. This effort also included a review of work management records, applicable site correspondence (Licensee Event Reports, etc.).

Industry OE that forms the basis for this program is included in the OE element of the corresponding NUREG-1801, Chapter XI, Program. Industry OE noted in NUREG-1801 has shown that failures have occurred on MEBs caused by cracked insulation and moisture or debris buildup internal to the MEB. Industry OE noted in NUREG-1801 has also shown that MEB exposed to appreciable ohmic or ambient heating during operation may experience loosening of bolted connections related to the repeated cycling of connected loads or of the ambient temperature environment. This phenomenon can occur in heavily loaded circuits (i.e., those exposed to appreciable ohmic heating or ambient heating) that are routinely cycled.

This review of plant-specific and industry-wide OE confirms that the OE discussed in the corresponding NUREG-1801, Chapter XI, Program is bounding, i.e., that there is no unique, plant-specific OE in addition to that in NUREG-1801. Going forward, OE will be captured through the CR-3 Corrective Action and Operating Experience Programs implemented in accordance with Progress Energy corporate procedures. This ongoing review of OE will continue throughout the period of extended operation, and the results will be maintained on site. The administrative controls that implement the Corrective Action and Operating Experience Programs are implemented in accordance with the CR-3 QA Program, which is in conformance with 10 CFR 50, Appendix B. This process will verify that all electrical programs credited for License Renewal will continue to be effective in the management of aging effects.

Conclusion

Implementation of the MEB Program will provide reasonable assurance that the intended functions of the non-segregated MEB within the scope of License Renewal will be maintained consistent with the CLB through the period of extended operation.

B.2.35 FUSE HOLDER PROGRAM

Program Description

The Fuse Holder Program is credited for the aging management of fuse holders located outside of active devices that are susceptible to aging effects. Fuse holders inside an active device, such as switchgear, power supplies, power inverters, battery chargers, control panels and circuit boards are not within the scope of this Program. The Program focuses on the metallic clamp (or clip) portion of the fuse holder. The parameters monitored include corrosion and oxidation. Identified fuse holders within the scope of License Renewal will be tested at least once every 10 years. Testing may include thermography, contact resistance testing, or other appropriate testing to be determined prior to Program implementation. The first test for License Renewal will be completed before the period of extended operation.

NUREG-1801 Consistency

The Fuse Holder Program is a new program consistent with NUREG-1801, Section XI.E4 with exceptions.

Exceptions to NUREG-1801

Program Elements Affected

- **Parameters Monitored/Inspected**
  Loss of continuity due to corrosion and oxidation will be managed by Fuse Holder Program. Fatigue due to ohmic heating, thermal cycling, electrical transients, frequent manipulation, vibration, and chemical contamination are not applicable aging effects for CR-3 fuse holders located outside of active devices.

Enhancements

None.

Operating Experience

This is a new aging management program for fuse holders. Therefore, there is no existing site specific OE to validate the effectiveness of this program. However, plant-specific and industry-wide OE was considered in the development of all electrical programs in Appendix B of the CR-3 LR Application. The review of plant specific and industry-wide OE ensures that the corresponding NUREG-1801, Chapter XI, Program will be an effective aging management program for the period of extended operation. Plant-specific OE for fuse holders has been captured by a review of one or more of the following: (1) the Action Tracking database, (2) System Engineering Notebooks and System Health Reports, and (3) discussions with site engineering personnel. This effort also included a review of work management records and applicable site correspondence (Licensee Event Reports, etc.).

Industry OE that forms the basis for this program is included in the OE element of the corresponding NUREG-1801, Chapter XI, Program. NUREG-1801 notes that loosening of fuse holders and corrosion of fuse clips are aging mechanisms that, if left unmanaged, can lead to a loss of electrical continuity function. Also, as stated in NUREG-1760, fuse holders experience a number of age-related failures. The major concern is that failures of a deteriorated cable system (cables, connections including fuse holders, and penetrations) might be induced during accident conditions since they are not subject to the environmental qualification requirements of 10 CFR 50.49.

This review of plant-specific and industry-wide OE confirms that the OE discussed in the corresponding NUREG-1801, Chapter XI, Program is bounding, i.e., that there is no unique, plant-specific OE in addition to that in NUREG-1801. Going forward, OE will be captured through the CR-3 Corrective Action and Operating Experience Programs implemented in accordance with Progress Energy corporate procedures. This ongoing review of OE will continue throughout the period of extended operation, and the results will be maintained on site. The administrative controls that implement the Corrective Action and Operating Experience Programs are implemented in accordance with the CR-3 QA Program, which is in conformance with 10 CFR 50, Appendix B. This process will verify that all electrical programs credited for License Renewal will continue to be effective in the management of aging effects.

Conclusion

Implementation of the Fuse Holder Program will provide reasonable assurance that the electrical continuity function of fuse holders within the scope of License Renewal located outside of active devices will be maintained consistent with the current licensing basis through the period of extended operation.

B.2.36 ELECTRICAL CABLE CONNECTIONS NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS PROGRAM

Program Description

The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is credited for aging management of cable connections not included in the CR-3 EQ Program. The Program will be implemented as a one-time inspection on a representative sample of non-EQ cables connections within the scope of License Renewal prior to the period of extended operation to provide an indication of the integrity of the cable connections. The specific type of test performed will be determined prior to testing, and is to be a proven test for detecting loose connections, such as thermography, contact resistance testing, or other appropriate testing judged to be effective in determining cable connection integrity. This Program does not include high-voltage (>35KV) switchyard connections. The aging effect/ mechanism of concern is:

- Loosening of Cable Connections

The factors considered for sample selection are application (high, medium and low voltage), circuit loading (high loading), and location (high temperature, high humidity, vibration, etc.) in both indoor and outdoor environments. The technical basis for the sample selections of cable connections to be tested will be provided.

The metallic parts of Metal Enclosed Bus connections are managed by the Metal Enclosed Bus Program as delineated in NUREG-1801, XI.E4, “Metal Enclosed Bus,” and are, therefore, not included within the scope of the Program.

NUREG-1801 Consistency

The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is a new program consistent with NUREG-1801, Section XI.E6, with exceptions.

Exceptions to NUREG-1801

<u>Program Elements Affected</u>

- **Scope of Program**
  NUREG-1801, Rev. 1, AMP XI.E6 states that connections associated with cables in scope of License Renewal are part of this Program, regardless of their association with active or passive components. However, CR-3 has applied the clarification provided in proposed LR-ISG-2007-02 dated August 29, 2007, that revises the scope to include only external cable connections terminating at an

active device such as motor, motor control center, switchgear, or of a passive device such as a fuse cabinet. Wiring connections internal to an active assembly installed by manufacturers are considered a part of the active assembly; and, therefore, are not within the scope of this Program.

- **Detection of Aging Effects**
  NUREG-1801, Rev. 1, AMP XI.E6 specifies periodic testing of connections using thermography, contact resistance testing, or other appropriate testing methods. However, consistent with the test frequency flexibility provided in proposed LR-ISG-2007-02 dated August 29, 2007, this element will be implemented as a one-time inspection on a representative sample of non-EQ cable connections within the scope of License Renewal prior to the period of extended operation. Inspection methods may include thermography, contact resistance testing, or other appropriate testing methods. This one-time inspection verifies that the loosening of connections due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation is not an aging effect that requires a periodic aging management program.

Enhancements

None.

Operating Experience

The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is a new program with no site specific OE history. However, plant-specific and industry-wide OE was considered in the development of all electrical programs in Appendix B of the CR-3 License Renewal Application. The review of plant-specific and industry-wide OE ensures that the corresponding NUREG-1801, Chapter XI, Program will be an effective aging management program for the period of extended operation. Plant-specific OE for cable connections has been captured by a review of one or more of the following: (1) the Action Tracking database, (2) System Engineering Notebooks and System Health Reports, and (3) discussions with site engineering personnel. This effort also included a review of work management records, applicable site correspondence (Licensee Event Reports, etc.), and Nuclear Assessment Section assessment records.

Industry OE that forms the basis for this program is included in the OE element of the corresponding NUREG-1801, Chapter XI, Program. NUREG-1801 notes that loose terminations were identified by several plants. Industry OE noted in NUREG-1801 has also shown that loosening of connections and corrosion of connections are aging mechanisms that, if left unmanaged, could lead to a loss of electrical continuity and potential arcing or fire.

This review of plant-specific and industry-wide OE confirms that the OE discussed in the corresponding NUREG-1801, Chapter XI, Program is bounding, i.e., that there is no unique, plant-specific OE in addition to that in NUREG-1801. Going forward, OE will be captured through the CR-3 Corrective Action and Operating Experience Programs implemented in accordance with Progress Energy corporate procedures. This ongoing review of OE will continue throughout the period of extended operation, and the results will be maintained on site. The administrative controls that implement the Corrective Action and Operating Experience Programs are implemented in accordance with the CR-3 QA Program, which is in conformance with 10 CFR 50, Appendix B. This process will verify that all electrical programs credited for License Renewal will continue to be effective in the management of aging effects.

Conclusion

Implementation of the Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program will provide reasonable assurance that electrical connections within the scope of License Renewal will be maintained consistent with the current licensing basis through the period of extended operation. This AMP will be effective for managing aging effects since it will incorporate proven monitoring techniques, acceptance criteria, corrective actions, and administrative controls.

B.2.37 CARBORUNDUM (B_4C) MONITORING PROGRAM

Program Description

The CR-3 Carborundum (B_4C) Monitoring Program is an existing program that monitors the effects of aging on the Carborundum (B_4C) panels that are located in the high density spent fuel storage racks in Spent Fuel Pool A.

Carborundum (B_4C) is a boron carbide shielding material utilized as a neutron absorber for the CR-3 spent fuel storage racks. Stability of the Carborundum (B_4C) supports the fuel storage pool Technical Specification criticality analysis requirement that the effective neutron multiplication factor (K_{eff}) of ≤ 0.95 must be maintained for all postulated events. The condition of the Carborundum (B_4C) poison material in the high density spent fuel racks located in Pool A is an indication of the K_{eff} of the fuel in the pool. The Program periodically removes and examines Carborundum (B_4C) poison samples from the pool to ensure that the K_{eff} is maintained below 0.95.

Aging Management Program Elements

The results of an evaluation of the aging management activities for the Carborundum (B_4C) Monitoring Program against the ten elements described in Appendix A of NUREG-1800 is provided below.

- **Scope of Program**
  The CR-3 Carborundum (B_4C) Monitoring Program monitors the effects of aging on the Carborundum (B_4C) panels located in the high density spent fuel storage racks in Spent Fuel Pool A.

- **Preventive Actions**
  No actions are taken as part of this inspection program to prevent or mitigate aging degradation.

- **Parameters Monitored/Inspected**
  The parameters monitored or inspected will verify that: (1) Carborundum (B_4C) sample coupons meet visual acceptance criteria and will be managed during the period of extended operation, and (2) Carborundum (B_4C) sample weight loss shall be within acceptable criteria and will be managed during the period of extended operation. The inspections monitor Carborundum (B_4C) samples that have been exposed to either: (1) gamma radiation dose plus borated water or (2) borated water alone to determine percentage weight loss of the sample. Based on the low percentage weight loss of Carborundum (B_4C) for sample inspections performed every five years; the inspection interval has been increased to nominally every 10 years.

- **Detection of Aging Effects**
  The Carborundum (B_4C) panels within the scope of this Program are to be inspected nominally every 10 years. This is an adequate period to detect aging effects before a loss of component intended function, since experience has shown that aging degradation for the Carborundum (B_4C) is a slow process. A 5-year nominal testing interval had been utilized up to 2004, and enough data has been accumulated to determine that the degradation (loss of material) rate is low enough to satisfy acceptance criteria through the period of extended operation.

- **Monitoring and Trending**
  Monitoring and trend data is incorporated in test procedures to be used to project and compare for upcoming sample testing. Trending of discrepancies is also performed (as required) in accordance with the Corrective Action Program. The Corrective Action Program is implemented by the CR-3 QA Program in accordance with 10 CFR 50, Appendix B. Prior to the period of extended operation, Program administrative controls will be revised to include provisions in the implementing procedure to monitor and trend weight loss data to ensure the projections meet acceptance criteria.

- **Acceptance Criteria**
  Inspection findings are to be within the acceptance criteria to ensure that the structure or component intended function(s) are maintained under all CLB design conditions during the period of extended operation. Program administrative controls contain the applicable acceptance criteria. Prior to the period of extended operation, Program administrative controls will be revised to incorporate acceptance criteria tables for accumulated weight losses of monitored Carborundum samples.

- **Corrective Actions**
  Corrective actions will be implemented through the CR-3 Corrective Action Program when inspection results do not meet the acceptance criteria. This program element is addressed in Subsection B.1.3.

- **Confirmation Process**
  This program element is addressed in Subsection B.1.3.

- **Administrative Controls**
  This program element is addressed in Subsection B.1.3.

- **Operating Experience**
  NUREG-1801 is based on industry OE through January 2005. NUREG-1801 and recent industry OE has been reviewed for applicability to CR-3. More recent OE is captured through the normal Operating Experience Program where it is

screened for applicability. This process will continue through the period of extended operation.

Plant-specific OE has also been reviewed. At CR-3, carborundum neutron absorber has been tested since 1984. Tests have been carried out on Carborundum (B_4C) sample coupons exposed to gamma dose plus borated water. Also, samples were tested that had been exposed to only borated water. A 5-year testing interval had been utilized up to 2004, and enough data has been accumulated to determine that the degradation rate is low enough to satisfy acceptance criteria through the period of extended operation. Additionally, because of the low degradation rate, the inspection interval has been increased to nominally every 10 years.

During 2004, OE included a failed sample for a weight loss of 21% (compared to 4% to 5% for the comparable samples). It was determined that the weight loss was a result of the material loss adjacent to the sample packet vent hole. It was also determined that the vent holes were above the active fuel length, therefore degradation opposite the vent holes would not result in neutron streaming and would have no effect on reactivity. Therefore, there are no adverse consequences from material degradation opposite the holes. The Spent Fuel Pool A criticality analysis remains valid. Also during 2004, a report was initiated concerning sample dose exposure. In 2001, during fuel movement for Spent Fuel Pool B re-rack, fuel was inadvertently moved away from the gamma sample holder. The total missed dose was estimated to be about 1% of the accumulated total dose on the samples. Since samples are exposed to accelerated gamma dose compared to the racks themselves; this 1% is considered insignificant. Therefore, the loss of exposure does not invalidate the spent fuel rack poison surveillance program.

A criticality analysis was performed for Spent Fuel Pool A. The analysis demonstrates that for the defined acceptance criteria, the maximum k_{eff} is less than 0.95 without credit for soluble boron at a 95% probability with a 95% confidence level. Under accident conditions, it is demonstrated that 165 ppm of soluble boron is required to assure that the maximum k_{eff} is less than or equal to 0.945. Technical Specification 3.7.14 requires maintaining a concentration of dissolved boron in the fuel pool ≥ 1925 ppm. This concentration of dissolved boron is the minimum required concentration for fuel assembly storage and movement within the fuel storage pool.

Conclusion

Continued implementation of the Carborundum (B_4C) Monitoring Program will provide reasonable assurance that the Carborundum (B_4C) panels that are located in the storage racks of Spent Fuel Storage Pool A will perform their intended function consistent with the CLB through the period of extended operation.

B.2.38 HIGH-VOLTAGE INSULATORS IN THE 230KV SWITCHYARD PROGRAM

Program Description

The High-Voltage Insulators in the 230KV Switchyard Program is credited for the aging management of the high-voltage insulators used in the power path for the overhead transmission conductors that connect CR-3 230KV Switchyard to the Backup Engineered Safeguards Transformer (BEST). The Program inspects the insulators for salt deposits or surface contamination and mechanical wear of the steel hardware connecting the insulators to one another. The high-voltage insulators within the scope of this Program are to be inspected at least once every four years. The first inspections for License Renewal are to be completed prior to the period of extended operation.

Aging Management Program Elements

The results of an evaluation of the aging management activities for the High-Voltage Insulators in the 230KV Switchyard Program against the ten elements described in Appendix A of NUREG-1800 is provided below.

- **Scope of Program**
  This Program applies to high-voltage insulators used in the power path for the overhead transmission conductors that connect CR-3 230KV Switchyard to the Backup Engineered Safeguards Transformer (BEST).

- **Preventive Actions**
  No actions are taken as part of this inspection Program to prevent or mitigate aging degradation.

- **Parameters Monitored/Inspected**
  The following parameters will be monitored/inspected to ensure component intended function during the period of extended operation: 1) evidence of salt deposits or surface contamination, and 2) mechanical wear of the steel hardware connecting the insulators to one another.

- **Detection of Aging Effects**
  The high-voltage insulators within the scope of this Program are to be inspected at least once every four years. This is an adequate frequency to detect aging effects before a loss of component intended function since experience has shown that aging degradation is a slow process. A four-year inspection interval will provide multiple data points during a 20-year period, which can be used to characterize the degradation rate. The first inspection for License Renewal is to be completed prior to the period of extended operation.

- **Monitoring and Trending**
  Trending actions are not part of this Program. However, trending of discrepancies is performed (as required) in accordance with the CR-3 Corrective Action Program. The Corrective Action Program is implemented by the CR-3 QA Program in accordance with 10 CFR 50, Appendix B.

- **Acceptance Criteria**
  Inspection results are to be within the acceptance criteria to ensure component intended function(s) are maintained under all CLB design conditions during the period of extended operation. Acceptance criteria will be delineated in the applicable inspection procedure.

- **Corrective Actions**
  Corrective actions will be implemented through the CR-3 Corrective Action Program when inspection results do not meet the acceptance criteria. Corrective actions may include, but are not limited to, washing, replacing or repairing affected high-voltage insulators. This program element is addressed in Subsection B.1.3.

- **Confirmation Process**
  This program element is addressed in Subsection B.1.3.

- **Administrative Controls**
  This program element is addressed in Subsection B.1.3.

- **Operating Experience**
  The High-Voltage Insulators in the 230KV Switchyard Program is a new program with no site specific OE history. However, plant-specific and industry-wide OE was considered in the development of all electrical programs in Appendix B of the CR-3 License Renewal Application. The review of plant-specific and industry-wide OE ensures that this will be an effective aging management program for the period of extended operation. Plant-specific OE for high voltage insulators has been captured by a review of one or more of the following: (1) the Action Tracking database, (2) System Engineering Notebooks and System Health Reports, and (3) discussions with site engineering personnel. This effort may have also included a review of work management records, applicable site correspondence (Licensee Event Reports, etc.), and Nuclear Assessment Section assessment records. The following are plant-specific OE applicable to this Program:

  - On March 17, 1993, CR-3 experienced a loss of the 230KV switchyard (i.e., a loss of offsite power) when a light rain caused arcing across salt-laden 230KV insulators and opened switchyard breakers. This event was the subject of NRC Information Notice NRC 93-95, dated December 13, 1993: "Storm-

Related Loss of Offsite Power Events Due to Salt Buildup on Switchyard Insulators."

- On September 6, 2004, CR-3 experienced phase-to-ground faults concurrently on a 230KV transmission line and a 230KV switchyard south bus breaker during Tropical Storm Frances. The transmission line fault was caused by mechanical failure of a carbon steel pin in a vertical string of insulators due to high wind conditions. The breaker fault was caused by flashover due to contamination from wind and salt spray.

Site- and industry-wide OE that forms the basis for this program has shown that various airborne materials such as dust, salt, and industrial effluents can contaminate insulator surfaces. A large buildup of contamination enables the conductor voltage to track along the surface more easily and can lead to insulator flashover. Operating experience has also shown that mechanical wear of the steel pins connecting the insulators to one another could lead to a loss of intended function if the insulators are subject to significant or prolonged movement.

Going forward, OE will be captured through the CR-3 Corrective Action and Operating Experience Programs implemented in accordance with Progress Energy corporate procedures. This ongoing review of OE will continue throughout the period of extended operation, and the results will be maintained on site. The administrative controls that implement the Corrective Action and Operating Experience Programs are implemented in accordance with the CR-3 QA Program, which is in conformance with 10 CFR 50, Appendix B. This process will verify that the electrical programs credited for License Renewal will continue to be effective in the management of aging effects.

Conclusion

Implementation of the High-Voltage Insulators in the 230KV Switchyard Program will provide reasonable assurance that high-voltage insulators will perform their intended function consistent with the current licensing basis through the period of extended operation.

B.3 TIME-LIMITED AGING ANALYSIS PROGRAMS

B.3.1 REACTOR COOLANT PRESSURE BOUNDARY FATIGUE MONITORING PROGRAM

Program Description

The Reactor Coolant Pressure Boundary (RCPB) Fatigue Monitoring Program includes preventive measures to mitigate fatigue cracking caused by anticipated cyclic strains in metal components of the RCPB. This is accomplished by monitoring and tracking the significant thermal and pressure transients for limiting RCPB components in order to prevent the fatigue design limit from being exceeded. The RCPB Fatigue Monitoring Program addresses the effects of the reactor coolant environment on component fatigue life by including, within the Program scope, environmental fatigue evaluations of the sample locations specified in NUREG/CR-6260, “Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components.” These locations were evaluated by applying environmental correction factors to ASME Section III, Class 1 fatigue analyses, as specified in NUREG/CR-6583,”Effects of LWR Coolant Environments on Fatigue Design Curves of Carbon and Low-Alloy Steels,” NUREG/CR-5704, “Effects of LWR Coolant Environments on Fatigue Design Curves of Austenitic Stainless Steels,” and NUREG/CR-6717, “Environmental Effects on Fatigue Crack Initiation in Piping and Pressure Vessel Steels.” Prior to exceeding the design limit, preventive and/or corrective actions are triggered by the Program. CR-3 has ensured that the effects of the reactor water environment on fatigue-sensitive locations have been addressed and are managed for the period of extended operation.

NUREG-1801 Consistency

The RCPB Fatigue Monitoring Program is an existing program that is consistent with NUREG-1801, Section X.M1.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

A review of NRC Generic Communications (Information Notices, Bulletins, Generic Letters, and Draft Generic Communication), the INPO OE database, and Licensee Event Reports was performed, but no applicable OE items were identified that relate to fatigue monitoring or to exceeding fatigue design limits. Assessments on the implementation of EPRI “Good Practice” documents released in accordance with the

NEI 03-08 materials initiative protocol related to fatigue were reviewed. The assessments revealed that the Program is in accordance with the “Good Practice” recommendations. The Program has been effective documenting transients and cycles on applicable systems and components so that the limits imposed by Technical Specifications and the FSAR are not exceeded.

Conclusion

Continued use of the RCPB Fatigue Monitoring Program will provide reasonable assurance that the fatigue design limits for applicable components/commodities will not be exceeded such that the components/commodities will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.3.2 ENVIRONMENTAL QUALIFICATION (EQ) PROGRAM

Program Description

The EQ Program is an existing CR-3 engineering program. The EQ Program manages component thermal, radiation, and cyclical aging through the use of aging analysis based on 10 CFR 50.49(f) qualification methods. As required by 10 CFR 50.49, EQ components not qualified for the current license term are to be refurbished or replaced, or have their qualification extended prior to reaching the aging limits established in the evaluation. Aging evaluations for EQ components that specify a qualification of at least 40 years are considered Time-Limited Aging Analyses (TLAAs) for CR-3 License Renewal. Refer to Section 4.4 for a discussion of EQ Program reanalysis attributes.

NUREG-1801 Consistency

The EQ Program is an existing program consistent with NUREG-1801, Section X.E1.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The CR-3 EQ Program has been effective at managing aging effects. As stated in NUREG-1801, EQ programs include consideration of OE to modify qualification bases and conclusions, including qualified life. Compliance with 10 CFR 50.49 provides reasonable assurance that components can perform their intended functions during accident conditions after experiencing the effects of in-service aging. Although the EQ Program System Health Report shows the program has a “Yellow” indication status, the overall effectiveness of the program is demonstrated by the “Green” status under key performance areas such as regulatory compliance, overall program effectiveness, and performance. The green program status is the highest ranking available and shows the Program’s strength in these areas. In addition, the EQ Program has been and continues to be subject to periodic internal and external assessments that effect continuous improvement. Administrative controls require periodic formal assessments of the EQ Program by knowledgeable personnel from outside the site EQ group.

Conclusion

The overall effectiveness of the EQ Program is demonstrated by the excellent OE for systems and components in the Program. The Program has been subject to periodic internal and external assessments that facilitate continuous improvement. Continued implementation of the CR-3 EQ Program provides reasonable assurance that aging effects will be managed such that the components within the scope of License Renewal will continue to perform their intended functions consistent with the CLB for the period of extended operation.

APPENDIX C

IDENTIFYING AGING EFFECTS BY MATERIAL AND ENVIRONMENT

Appendix C is not being used in this application.

APPENDIX D

TECHNICAL SPECIFICATION CHANGES

10 CFR 54.22 requires that an application for license renewal include any technical specification changes or additions necessary to manage the effects of aging during the period of extended operation. No changes to the CR-3 Technical Specifications are required to support the License Renewal Application. Therefore, Appendix D is not being used in this application.